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# ON CANCER

ITS

ALLIES AND OTHER TUMOURS .



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# ON CANCER

ITS

ALLIES AND OTHER TUMOURS

WITH-

SPECIAL REFERENCE TO THEIR

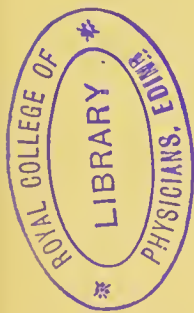
MEDICAL AND SURGICAL TREATMENT

BY

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ETC. ETC. ETC.

WITH MICROSCOPICAL ILLUSTRATIONS



LONDON

J. & A. CHURCHILL, NEW BURLINGTON STREET

1881





## PREFACE

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I ENDEAVOUR in the present little volume to remove some of the difficulties which surround the diagnosis of a confessedly obscure disease—cancer. Whether the plan adopted is in any degree successful must remain for the profession to decide.

I have adopted the anatomical classification as being the most scientific method, and I simply attempt to offer a concise picture of the vital processes.

Nothing but a comprehensive and practical view of any diseased action will ever enable us to give such a knowledge of its nature as will lead either to its prevention or proper treatment.

In order that the reader of the following pages may not be disappointed with their contents, it is necessary to observe that they are not intended to introduce any newly discovered cure for cancer, or to advance any speculative theory as to the origin of cancerous growths.

I have now devoted much time to the study of

cancer, more especially in its secondary and constitutional forms, taking advantage of the extended field of observation which a special institution such as The Cancer Hospital constantly presents.

The results of my experience are here recorded ; and the views that I have propounded, and those that I have adopted from other authors, may, I hope, contribute in some measure to the insight of so distressing a malady.

The drawings, executed for me by Mr C. D'Alton, will, I trust, give no little assistance in distinguishing the many forms of cancer.

F. ALBERT PURCELL, M.D.

7, MANCHESTER SQUARE ;

*May*, 1881.



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# ON CANCER

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## CHAPTER I

### INTRODUCTION

THE subject cancer is a wide one, far too wide to be embraced within the limits of this work, and I feel a difficulty in condensing it within a reasonable compass.

I may state, that I have omitted all reference to names, I give my own ideas or those I have adopted from others.

I am fully conscious of the difficulties of my task, and of the deficiencies which will be found in its execution, nevertheless, I hope that the large opportunities for observation afforded me in the Cancer Hospital at Brompton may prove a sufficient apology for my venturing to bring forward opinions of my own, but I do not wish to appear as tilting against observers whose opinions are more entitled to respect, perhaps, than my own.

Hitherto our modes of treatment of cancer have been confessedly unsatisfactory, and so long as our ignorance of the pathology of the disease pre-

vented us from being able to suggest a reliable prognosis, in most cases, the results of the various remedies from time to time proposed could not possibly be fairly weighed, for when a new remedy appeared to be successful, there always remained a doubt as to the nature of the tumour treated and consequently of the share of the remedy in its removal.

Pathology, I think, of all studies, would be the most repulsive if it were not for some hope of utility coming out of it. We have failed in hundreds and thousands of cases : for years, for centuries, we have failed to cure cancer when treating it as a purely local disease.

I think in this matter we surgeons might very profitably take a lesson from the physicians, and with the aids now in our possession, for as with them we have the microscope in common, so that it behoves us to recognise that we can no longer content ourselves with the assertion that a given case is one of cancer. To give a reliable prognosis, nay, even to decide upon the suitable treatment, we must look further ; we must see to what special class of malignant growths the case properly belongs, and as the fashion was formerly to follow a clinical classification, so now, as on the Continent, a greater number of surgeons begin to recognise a definite anatomical classification as the most scientific method, it being more in accordance with the methods which are adopted in arranging plants and animals, methods from which the best results have been obtained, and by which our knowledge of botany and zoology has probably been much increased.

It cannot, of course, be maintained that the anatomical classification is perfect, or that it fulfils every purpose for which it was designed.

Although little can be said against the anatomical method of arrangement, much objection may be fairly made to its nomenclature.

It is not so very long since diseases very different were grouped together under the title of "continued fever." The laborious observations of such workers as Jenner, Stewart, and Murchison, have shown in what very important details the several fevers differ; and already our advance in diagnosis has not only affected materially the confidence of our prognosis in these cases, but, although we are still unable to cure a fever, we derive therefrom most valuable aid in conducting its treatment; and most important of all, we have already made great strides in prophylaxis, and may expect to do a great deal more in this direction, as exact knowledge of the subject becomes more widely diffused.

In like manner it is probable that, if we steadily work on at the minute structure of tumours, and take care to associate with the points so made out the symptoms to be noted at the bedside, and during their whole course, we shall be before long in a position to say not only that a given tumour having a special structure is probably malignant, but we shall be prepared to encounter special glandular conditions, we shall be able to predict where, when, and under what circumstances the tumour may be recurrent, and we shall be able to apply the appropriate treatment.

The works of modern surgery not only declare a belief that a cure may be found, but more than once

have heralded forth some drug as the true antidote for the horrible cancer poison. Even the discovery of the worthlessness of each of these has not shaken the faith in the existenee of sueh an antidote. We must, therefore, own although the much desired remedy may exist, and may at any moment be brought to light, it is equally possible that we may have to wait for it for some long time yet.

But in seeking for a cure we must avoid what are termed cancer cures and cancer curers, and it will do much good to expose the impostures of the pretended cancer curers, sueh as Dr Fell, Vriès, the Docteur Noir, and the Rev. Hugh Read, the Curate of St Sepulehre's, City, Patterson, and others. What more is needed to show the baselessness of a "painless and effectual cancer curer," than the melancholy case of Mrs Gosse, as related by her husband, Philip Henry Gosse, F.R.S., and published by Messrs Nesbit, in 1857? But if need be other eases of the kind can be added. All these matters are presented to us in a very agreeable form in a pamphlet by Mr T. Spencer Wells, F.R.C.S., 1860, and well worthy of being read.

"About the end of April, 1856, Mrs Gosse became eonscious of a hard lump in her left breast, which was pronounced to be cancer, and for which excision was recommended." The narrative then proceeds. "But my relative had heard of an American, who professed to eure cancer by a new process, without the need of an operation; and as he was said to invite the notice of the faculty, Dr —— kindly offered to attend on one of his public days, and let us know the result. He accordingly went, and



from his report we determined to consult the American physician, residing at Pimlico.

“On our visit, he professed to be in possession of a secret medicament, by the external application of which to a cancer the diseased portion gradually became dead, spontaneously separated from the healthy flesh, and sloughed away, leaving a cavity, which soon healed, and the patient was well. He showed us photographs of many patients in different stages of cure, many large tumours preserved in spirits, which had been sloughed away under his treatment, and what was still more to the point, we saw one of his patients dressed. This was a middle-aged woman, suffering under cancer of the breast, who told us she had been three weeks under Dr Fell. We saw the large tumour, dark, hard and apparently dead, deeply scored across, and divided by a distinct line of demarcation from the white living flesh around. We saw that when the doctor applied his fingers there was a separation, all round, of the dead tumour from the healthy flesh, so that we could see down to the depth of an inch or more, in which there was no union of part with part, except that of a few mucous threads, which he divided with scissors. The woman declared that the pain of the process was not worth speaking of.

“These things we saw, but for others we were dependent on testimony only; as, for instance, the painlessness of the treatment, in which, to judge from what my beloved Emily subsequently underwent, as well as others who were treated coetaneously with her, I believe we were greatly deceived. We asked concerning the probabilities of the cure being a complete one. Dr Fell assured us that he and the few

co-possessors of the secret in the United States, had found that out of every hundred cases treated, not more than twenty instances occurred of a return or reappearance of the disease; whereas, in ordinary surgical practice, as many as eighty per cent. is about the average of recurrence.

“On the 12th May, my dearest wife was placed under the care of Dr Fell. He conceived hopes that the tumour might be dispersed or absorbed without extraction; and at all events recommended that this alternative should be tried for some time. He distinctly assured us, over and over, that even should this hope be disappointed, the tumour would not be in a condition appreciably less favorable for the extractive treatment, after the lapse of a few months, than at that time; and he entertained confidence that the case was one which he should be able to bring to a happy issue.

“He commenced by applying two or three kinds of ointment to the breast, using them alternately on successive days; and this mode of treatment was continued until the end of August. It involved the necessity of my beloved wife’s going from Islington to Pimlico three times a week—a wearisome task, but which opened up to her, what she greatly loved and valued, opportunities of serving her Lord in testimony, both by distribution of gospel tracts, and by conversation with strangers.

“One of the unguents employed was attended with pain, presently causing a gnawing or aching in the breast, which at times was scarcely supportable. No marked change occurred in the appearance or feeling of the tumour throughout the summer. It certainly had not extended, and we fancied its



volume was slightly diminished. It was not the seat of any pain, except what was produced by the application."

Then follows an account of an autumn holiday at Tenby, Mr Gosse says:—"Our sojourn at Tenby continued from the 29th August to the 2nd of October. During the first three weeks my Emily was ill with general weakness and headache; and afterwards the use of the ointments furnished by Dr Fell produced such intense aching and 'drawing' pain in the tumour that altogether it was a time of much suffering.

"We returned home on the 2nd of October and immediately saw Dr Fell, who advised the removal of the tumour. The lack of any result from the five months' attempt to disperse it had led us to look to such a course as the most hopeful. On the 10th, therefore, my beloved, accompanied by our little boy, her faithful companion and assiduous nurse throughout her trial, removed to a lodging in Pimlico, uncomfortable in many respects, but presenting the advantage of being next door to Dr Fell's own residence. The next morning October 11th, the process of extraction commenced.

"The whole surface of the left breast, an area of four inches in diameter, was wetted with nitric acid, applied by means of a small bit of sponge tied to the end of a stick. The object of this application was to remove the skin. The smart was very trying, and continued for several hours augmenting, the effect being to blister and destroy the whole skin, exactly as if a severe burn had taken place.

"On the succeeding day, the doctor proceeded to incise the tumour, in order that it might be pene-

trated by the peculiar medicament which he used for its separation. With the scalpel he drew, on the surface of the now exposed flesh, a series of parallel scratches, about half an inch apart, reaching from the top to the bottom. When these were made a plaster of a purple mucilaginous substance was spread over the whole. The next day, on renewing this plaster, the scalpel was passed again along the scratches, deepening them a very little ; and a fresh plaster was applied. By the daily repetition of this operation, the scratches were in a few days deepened into long parallel cuts or scores, into which narrow strips of linen rag, covered with the purple mucilage, were pressed, instead of the common plaster. Every day these strips of rag were renewed, and the scores were made deeper and deeper.

“ The effect of this application was very distressing. In about an hour after its renewal every morning, the breast began to be the seat of an aching, piercing pain, under which my beloved sufferer was fain to wander up and down her narrow room, leaning now and then her head upon the mantelpiece or against the wall, unable from the agony to lie, sit, or stand. For several hours this continued, after which the intensity of the anguish commonly abated. Abatement of suffering, however, was the most she could look for ; suffering never ceased from the beginning of the operation till her spirit was freed from worn out body. Her sleep was greatly disturbed by the pain. In health she had been accustomed to sleep well, and had been generally able to forget herself in a few moments after lying down, whether by day or night. But from the commencement of the extraction to her departure

it was a rare thing with her to be unconscious more than half an hour at a time, and a large portion of every night was passed in the wakefulness of pain. From the first she was unable to lie down, so that the repose she took was in a semi-recumbent position, propped up by pillows. The progress of the operation was attended by considerable aching and loss of muscular power in the left arm, which prevented her from reclining at all on that side; hence she was reduced to use the half-sitting posture, varied occasionally by a very slight leaning over to the right side.

“The only sleep she obtained, for the most part of the time she was at Pimlico, was induced by opiates. We were very reluctant to use them, but Dr F— urged them upon my beloved as absolutely necessary, and the experience that sleep was out of the question naturally, induced her to yield. She took the preparation known as Battley’s sedative, commencing with twelve drops, but at length taking twenty to twenty-five drops nightly.

“The scoring of the tumour was not attended with any pain. The purple mucilaginous substance had evidently a caustic power, killing the flesh so far as it penetrated. It had, too, an antiseptic property; for the part so destroyed had no tendency to decomposition; it was brought to a woody hardness, and a deep black colour, without the least odour. It was one merciful mitigation of her sufferings that all the time she was under Dr Fell, not the slightest offensive odour was perceptible from the disease.

“When the incisions had reached the depth of about an inch and a quarter, the operator announced

that he had reached the bottom of the cancer. He now scored no more but applied a 'girdle' or annular plaster around the line where the killed tumour adjoined the living flesh, a line which was marked with perfect definiteness. The object was now to promote a suppuration, whereby the tumour should be gradually detached from the flesh, and sloughed off, like a stone dropped out of a basin. It was nearly four weeks after the removal of the skin that the 'girdle' was first put on, and two weeks more before the tumour came away. A furrow, gradually deepening, formed between the living flesh and the hard and black tumour, and this was filled with pus. The sensation now became that of a heavy weight dragging at the breast, and this feeling increased as the connection between the parts daily diminished. At length, on Sunday, the 23rd November, to our delight, the great insensible tumour fell out of its cavity, hanging only by a slender, fleshy thread, which presently yielded, and the breast was relieved of its load, the dead body that it had so long carried about.

"There it lay on the table, a hard and solid block of black substance, resembling in size and shape a penny bun, deeply scored on one surface, and on the other nearly smooth. And then on the breast of my beloved sufferer was the corresponding cavity, raw and partly lined with pus, but presenting an apparently healthy appearance.

"This was the point to which our hopes had been directed for six weeks past, hopes not unmingled with fears, however, for we had ascertained that, not unfrequently, after the main tumour had come away, as in this instance, a piece of the diseased flesh



was left, a sort of offshoot of the tumour, in the bottom of the cavity, embedded in the flesh. In such case there was no alternative but to treat this piece with the purple mucilage, like the original tumour.

“The cup was soon dashed from our lips; for the doctor presently announced that there was a large piece on the outer edge of the cavity, which, though he could not say it was actually cancerous, he deemed it prudent to take away. The whole painful process had to be gone over again, with the exception of the application of the nitric acid.

“Nearly four weeks more of the grinding, wearing agony were now to be borne; by which time the continued pain, the sleepless nights, and the violence done to the whole system by the destruction of so large a portion of the tissues had accomplished a work but too perceptible. Her strength was greatly reduced; to the last she crawled in every morning from her lodgings to Dr Fell’s (now removed to Warwick Square) and back, a distance of about a quarter of a mile, but it was a slow process, not performed without assistance, and it left her much exhausted, yet she always enjoyed the fresh air and the effort.”

After describing the patients who “crowded the waiting-room,” and speaking of some of them who “passed before her into the presence of their Lord, going home only to die,” the narrative proceeds:

“On the 17th of December, the second portion of the tumour, which had been treated since the 23rd of November, a mass about as large as a hen’s egg, from the outer side of the breast, detached itself; and again hope was raised. This hope was

not, however, unmixed; for both on the inner and on the outer side of the wound, on the surface that had hitherto appeared sound, indications had begun to manifest themselves that gave us anxiety.

“ Pimples were forming, especially under the arm; and though Dr Fell had hitherto treated them lightly, we did not feel able to rely on his opinion with the same buoyant confidence as at first. As before, he waited a few days before he would give any information as to the course he would follow, now that this epoch was reached.

“ At length, on Monday the 22nd, he said, after examining the wound, ‘ Mrs Gosse, I am very sorry for this, I shall have to take out another piece under the arm.’ Her heart sank at this announcement, but she replied: ‘ And what then, Doctor?’ ‘ Then I must treat this other part on the inner side of the breast.’ ‘ But how do you account for this spreading of the disease beyond the part you have all along been dealing with?’ ‘ Oh, ’tis in your blood.’

“ She said no more, but calmly took her leave; and in the afternoon, when I returned to her from my daily work, she told me of the result. Worn down as she was, she felt that she could not undergo the pain of a third, and then a fourth process, the unintermitted agony of which she had sufficiently proved, especially as there seemed no reasonable hope that the merely local mode of treatment hitherto pursued would, if continued, overtake a disease which had already spread so far beyond the area originally attacked. We had, moreover, been all along assured that cancer was a local and not a constitutional disease; and therefore the announce-

ment that it was seated in the blood, while indeed, we had good reason to believe it true, took us by surprise, as contrary to the statements we had all along relied on. The question, too, was obvious, 'What is the use of a merely local treatment of a disease which is seated in the blood?' "

The "personal kindness and attention" of Dr Fell are spoken of "most gratefully;" but Mr Gosse then gave up the treatment, and his wife was removed home. He adds that about the middle of January "the cancer began rapidly to assume a virulent appearance; the cavity produced by the extraction of the tumours was somewhat diminished in area, and skinned over, except in the centre, where there was a mass of raw, fungoid flesh, on which a fetid pus copiously formed. The pimples around increased in number, and some of them were attended with smarting, stinging pain. A large area on all sides of the wound became swollen, livid, and quite hard to the touch. There was no shooting or lancinating pain in any part, but a burning heat in the rough pimply surface beneath the armpit, with aching in the shoulder and arm, reaching down to the hand. This arm, the left, was now become useless. These local sufferings were accompanied by shifting rheumatoid pains in the body, alternations of burning feverishness and sudden chills, paroxysms of coughing, and great debility."

And so on with slight variations, till her death on the 7th of February.

I feel certain, and who will not agree? that any surgeon who reads this harrowing narrative of useless torture, and compares the history of this painful case with others in which he has removed



large cancerous growths in a few seconds without pain to the patient, under the anæsthetic influence of chloroform or ether, or nitrous oxide gas and ether, and under the antiseptic method of operating, now, I am glad to say, so universally adopted, and has seen the clean cut wound he has made unite in a few days, will be shocked by the contrast.

It is but fair to give Fell's compounds, and which he did (in a short work published by Churchill, 1857) under a pledge that the full particulars of his system of treatment should be published within a given time, and having first, in confidence, communicated to the surgical staff the nature of the remedies employed by him, the method of their preparation and the mode of using them, Fell was permitted to treat a certain number of cancer cases in the Middlesex Hospital. In his work he proceeds to assert that the *Sanguinaria canadensis* is the real remedy both for removing the external manifestations of the disease, and for eradicating the constitutional taint. This is a perennial plant, which is used by the North American Indians on the shores of Lake Superior for the cure of cancer and similar diseases, and is commonly known among them under the name of puccoon. It grows in great abundance in the wild forests and plains of the far west, and in many parts it covers the ground with its large white blossoms. The puccoon appears to have a place in the Pharmacopœia of the United States, as a powerful emmenagogue, emetic, and alterative, when given internally, and as an escharotic when applied to fungous growths. He combined it with various substances, with a view to hasten its action, according to the following formula :

℞ Sanguinariæ canadensis, ʒss vel ʒj;  
 Chlor. Zinci, ʒij vel ʒss;  
 Aquæ, ʒij;  
 Pulv. Sem. Tritic. Hibern., q. s.  
 Mix and form a paste the consistence of treacle.

This is spread upon strips of cloth, cotton, or wool, and inserted daily into the incisions, to remove the part primarily affected, applying at the same time the following ointment spread upon cotton over the enlarged gland or secondary tumour. This ointment is composed as follows (and called the brown ointment):

℞ Sulph. Zinci, ʒvj;  
 Sanguinariæ, ʒij;  
 Myricæ Ceriferæ, ʒj;  
 Extr. Opii (aquos.);  
 Extr. Conii, āā ʒvj;  
 Ung. Cetacei, ʒvj.  
 Mist. et fiat ung.

In conjunction with this preparation, he used an ointment of the iodide of lead, generally applying each twelve hours alternately. The following is the formula:

℞ Iod. Plumbi, ʒj;  
 Glycerine, ʒj;  
 Ung. Cetacei, ʒij.  
 Fiat ung.

The surgeons of the Middlesex Hospital in their report, in answer to the question, Does it cause less pain? reply, "That all the patients have suffered pain during the treatment; some have spoken lightly of their sensations, others have complained much. No one, however, has sustained that acuteness and severity of pain which characterises the action of caustics, as ordinarily employed; and it has been observed that the pain has usually been referred, not

to the tumour itself, but to parts at some distance from it, as in the case of the mamma, to the shoulder and arm."

It is very interesting to see how recent doings have been anticipated, and how even the scoring the eschar, as practised by Dr Fell, is not altogether a new idea. And it is curious to remark how imitative even great discoverers may be. The escharotic effects of arsenic were known to the Greek and Roman physicians, and they were not forgotten in the middle ages. The mineral had been used for centuries in the removal of cancerous diseases. Plunket added some crow's-foot and dog fennel to it, and became a great cancer curer in London in the early part of last century. The chloride of zinc is proved to be an excellent caustic by Hancke, Canquoin, Alex. Ure, and others. It was Guy's caustic, or rather the Plunket's paste, that killed Lord Bolingbroke, and many others were poisoned by the local use of arsenic; yet this did not prevent Lord Arundel from buying the receipt from Elizabeth Fellow, the wife of a blacksmith, so ignorant that she could not sign her name, but a noted cancer curer. This was long known as Lord Arundel's cancer cure. It was an arsenical powder, and a wash of corrosive sublimate, and no doubt killed a great number of poor women. However, like Plunket's paste, a great many cancerous and other tumours were removed entire by it; and Mr Justamond, who was surgeon to the Westminster Hospital some hundred of years ago, tried them both very extensively, arriving at the conclusion that the advantage gained did not compensate for the risk incurred. It is curious to find how Mr Justamond

anticipated modes of treatment that were current in London some few years ago, and are still carried out at the present time by cancer curers; in a pamphlet he published in 1780, giving an account of his experiments. The modern cancer curers have not taught us anything new. They have not taught us how to remove cancer by caustics. They have not taught us to discard arsenic. We had done that long ago, except in those cases of small superficial malignant ulceration, in which, in a dilute form, it is still the best remedy known. They have not given us any new caustic, and they cannot show that their caustics, as prepared and used by themselves, have any advantage over the knife.

Landolfi, a Neapolitan physician, may be looked upon as the prince of the cancer curers. He was decorated with orders of knighthood by sovereign princes, was alternately flattered and abused, and made an immense fortune. He made no secret of his plan. 'Landolfi's paste,' as his caustic was called, was composed of equal parts of the chlorides of zinc, bromine, gold, and antimony, made into a paste with flour or liquorice powder. Sometimes he used the chloride of bromine alone, using it both externally and internally; and when the slough had been formed he used lettuce poultices till it separated. There can be no doubt that Landolfi removed an immense number of cancerous tumours by his paste in Italy, Germany, and France, and that healthy granulations sprung up, and firm cicatrices very often resulted. He used to assert that out of 4000 cases of cancer he had treated, the disease had not recurred in 3000. This is what he said. He never offered anything like proof of the truth of this statement; and when his



caustic was tried in the hospitals of Vienna and Paris the conclusions arrived at were that it was decidedly inferior to the chloride of zinc. Landolfi went himself to Paris, and a number of patients were treated by him in the Salpêtrière, under the inspection of a committee of hospital surgeons, appointed by the Académie des Sciences, consisting of MM. Broca, Cazolis, Furnani, Manec, Mounier, and Moissenet. Their report was published May 9th, 1856.\*

The conclusions were that the chloride of bromine, which is the only peculiarity in Landolfi's treatment, is quite useless as an internal remedy; and that locally it only acts as a blister, raising the epidermis and exposing the denuded part to the action of the chlorides of zinc and antimony, acting just as the ranunculus did in Plunket's paste, the nitrate of silver as used by Justamond, or like any common blister. The committee reported that the pain produced by this caustic was excessive, and that it did not secure the patients from the danger of erysipelas or hæmorrhage. Landolfi does not appear to have been more successful in Germany than in France. Landolfi by ministerial authority selected six cases himself at the Vienna Hospital, and treated them under the observation of a committee, yet he only cured one, and that was an innocent tumour, a partial hypertrophy of the mamma, for which he destroyed the whole breast quite unnecessarily, and produced a large unsound cicatrix. Well may the French committee add that Landolfi's method "adds another to the illusions that so abound in the history of cancer."

Dr Pattison, some years ago, occupied much the

\* 'Gaz. Hebdom. de Méd. et Chir.,' May 9, 1856.

same position in London that Dr Fell did subsequently. The difference between them was that Dr Fell made known the composition of the remedies he employed, while Dr Pattison did not.

At the present time we have the St Saviour's Hospital specially founded for the treatment of cancer and other tumours, without the use of the knife, Michel's process, conducted by Mr Henry W. Robinson. The sisters were kind enough to show me the cancer-stones, preserved and kept in bottles, that had been sloughed out; and many patients, having undergone treatment at St Saviour's, have presented themselves in our out-patient department in a most deplorable condition, many telling the same sad tale as that related by Mr Gosse.

In the meantime how can we treat cancer? First, we have gradually come to the opinion, the strength of which increases rather than diminishes, that the removal of a cancer when practicable is the best treatment, that even if it does not delay the fatal termination even for a time, it is yet worth the patient's while to submit to the risk and trouble of operation, with a view of removing a continual source of fear and misery, and of rendering the end more easy; but if it has to be dealt with locally at all, ought to be removed at as early a period as possible.

Even before the improvements in the methods of operation and before the introduction of anæsthetics or the antiseptic treatment (Listerism) this was the prevailing opinion. Now, naturally it is still more so. But we may do more than this. We have improved in diagnosis, therefore in prognosis. This we may undoubtedly use to the advantage of

the patient. It is often of the greatest consequence to be able to foretell as early as possible what the result of the disease may be. Again, we are in a position to warn those in whose families cancer is strongly hereditary that in becoming parents they are likely to hand down to their offspring the hideous tendency which has not yet developed into a reality in themselves.

Secondly. In a large number of cases there is a period when the cancerous tumour ceases to increase, begins to diminish, and gradually to waste away, so that the prolongation of life is not in any way affected by the patient having been subject to this malady. Several cases of cure by atrophy could be recited from amongst the patients at the Cancer Hospital. If nature is sufficient even in a few cases to check the disease, may we not fairly expect that some means which we possess so abundantly for encouraging a healthful condition of the solids and fluids of the body shall be effective in the assistance of the vital powers to stop the further growth of the disease.

All medicines or dietaries of a lowering description must be repudiated. All the soporifics should be objected to, as adding to the dyscrasia, and when from the entreaties of patients it becomes necessary to have recourse to them all hope of remedy must be put aside. Arsenic has formed most of the secret remedies which from time to time have cropped up, exciting all the superstitious reverence which more or less lurks in every breast; but according to experience, its usefulness, either internally or externally, does not compare to other certain and less dangerous tonics and escharotics.



Of all medicaments which experience or theory has shown to influence the disease, iron in its various forms is capable of effecting the largest amount of good. In order to obtain this good in various constitutions it is necessary to vary the form of its administration, and then to alternate this tonic with others. The mineral acids are most valuable, bark and cod-liver oil. Diet and moral management are of the utmost moment in the conduct of these cases. It is impossible to lay down dietetic rules applicable to every case, since each person has his or her peculiarities, and must be managed in accordance with them; but it is requisite that the system be amply nourished and somewhat stimulated, good meat, good beer, stout, wine according to advice, vegetables. The treatment of the mind is not less important. Hope would assist our efforts at restoration more perhaps than any physical agent. The diversion of the mind from the contemplation of the malady by the influence of genial society, by change of scene in travel, have tended to the production of that atrophy of the disease, which is in fact its cure.

If we have any hope at all of curing cancer it must be in the study of it as a constitutional disease, for as far as therapeutics yet have proceeded nearly the whole power of therapeutics is that of constitutional remedies against constitutional disease. If we look, and we do look, for a hope of recovery from cancer, it is in the earnest constant study of the constitutional characters of cancer, that some day there may come to us a remedy.

## CHIAN TURPENTINE

It would have been gratifying to the staff of our Cancer Hospital to have reported a number of successes and to have congratulated Professor John Clay, of Queen's Hospital, Birmingham, upon having made the discovery of a cure for cancer, which statement he made in a paper in the 'Lancet' of March 27th, 1880, "On the Treatment of Cancer of the Female Generative Organs by a New Method," viz. by the internal administration of Chian turpentine, which naturally excited great attention and induced hospital physicians and surgeons to make a prompt trial of the remedy, which he declared to have achieved highly satisfactory results in the relief, if not also the cure of a disease that has hitherto baffled treatment. It was important under these circumstances to make sure that the drug employed was certainly what it purported to be. As a matter of fact, it is by no means easy to obtain Chian or Cyprus turpentine. For so long ago as the date of the publication of the earlier editions of Pareira's *Materia Medica*, there was so much difficulty in procuring the substance that the profession was especially warned against the almost inevitable substitution of Venice or Canada turpentine, or some other terebinth of totally different properties, in dispensing of prescriptions for Chian turpentine. We were obliged to take note of this, as Professor Clay stated in his paper "no other terebinth except the Chian has been known or can be expected to produce the effects which have followed its use in his cases." I need not say that we spared no trouble or expense, and in fact, had the good fortune of

securing some out of the very stock that Professor Clay himself obtained his supply from.

With implicit faith in the statement coming from such a man as Professor Clay, without prejudiced scepticism and with earnest determination to test the remedy, impressed then, with these views, fortified with a consciousness of the clinical investigation, which was made during a period of twelve months by Professor Clay, we placed all the cases the most suitable for the treatment on to the Chian turpentine, keeping each specimen of the drug supplied us (for we had many sent to us from all sides) distinctly labelled, and the one allotted to the case selected for its exhibition was duly noted, so that if a relief of the disease or an approaching tendency to cure was reported, we were in a position to record which and from whence the specimen came.

But after a long and careful trial, the conclusion forced upon us is that, as a cure for cancer, or even in arresting the disease, the Chian turpentine is utterly valueless.

We did not find it to be relied upon to assuage pain, or in any way to verify Professor Clay's statement, viz. "That it is a most efficient anodyne, causing an entire cessation of pain in a few days, and far more effectually than any other sedative that I have ever given;"—nor to diminish or alter the character of the discharges, or to check hæmorrhage;—or to in any way approach the effect as stated by him, "That the turpentine appears to act upon the periphery of the growth with great vigour, causing the speedy disappearance of what is usually termed the cancerous infiltration, and thereby

arresting the further development of the tumour. It produces equally efficient results on the whole mass, seemingly destroying its vitality, but more slowly. It appears to dissolve all the cancer cells, leaving the vessels to become subsequently atrophied, and the firmer structures to gradually gain a comparative normal condition." No report in any of our cases at the Cancer Hospital or in our private practice at all verified the statement of Professor Clay, and which he made in the notes of the second (uterine) case he reported, viz. "The turpentine acted upon the growth with great vigour, literally melting it away in the brief period of four or five weeks."

#### ON OPERATIONS

I am glad to embrace this opportunity of bearing my testimony and of recording my great appreciation of the antiseptic method of operating (Listerism). This method I had the extreme gratification of introducing into the practice of the Cancer Hospital, and which has been of such undoubted benefit to the unfortunate patients who have had to undergo operation, enabling them to "get up" within a few days after, simplifying their dressings, consequently their tortures, allowing their wounds to heal without generating pus, shortening their sojourn in the hospital wards by at least two thirds of the time originally spent after the old method, thereby preserving the recuperative powers, and letting them avail themselves of early open air exercise, so necessary to a convalescent patient, more especially a cancer patient.



My colleagues one and all adopt "Listerism," and since its adoption I confidently affirm that our wards have been free from septo-pyæmic poisoning, and outbreaks of erysipelas, so frequent heretofore, prevented; such cases as have occurred have been easily isolated and the further spread obviated, and the wards kept open, and other operations undertaken.

No doubt many cases have had the good fortune of doing well without "Listerism," or with only partial antiseptic treatment, for nature seems well able to wage war against her minute enemies, the all-mischievous germs; it is only when she is handicapped by bad health, bad hygiene, or bad surgery, that she proves unequal to it. To save even a small percentage of cases which without such assistance are unable to withstand the germs, Listerism is well worth all the trouble it may entail.

### LISTERISM

It is worth while to lay before you the means by which these results have been obtained. In the first place the skin is well washed with one-in-twenty watery solution of carbolic acid, which has the power of penetrating the epidermis and hair-follicles and any greasy dirt that there may be on the skin, so that it is quite unnecessary to do as many of our German friends do, wash the skin with soap and water, and afterwards with sulphuric ether. Give the carbolic lotion a little time to act, and it will be sure to purify the integument.

In the next place, the sponges, the instruments,

and hands both of operator, assistants, and nurses should be cleansed with the carbolic solution (1 in 40).

It is necessary, if the spray is to be effectual, to be particularly careful to have a thoroughly reliable apparatus for its production (using the same strength solution 1 in 20), and that all our manipulations are so conducted that there shall never be a chance of any air other than spray being introduced into the wound.

The ligatures used are the prepared carbolised catgut in three sizes, of which hereafter, horse-hair or caoutchouc carbolised for drainage tubes, and horsehair for sutures.

The removal of parts having been completed and all hæmorrhage stopped, the skin around cleaned off, we take our drainage tube, whether it be the bundle of horsehair or india-rubber tubing (horsehair is the one I prefer), passing it through the 1 in 40 carbolic acid solution, place it into the wound to be drained; the flaps are accurately brought together, if not in exact apposition, at all events as close as it is possible to bring them. I have often found great advantage in the use of the button-stitches of relaxation; the edges are secured by means of horsehair sutures, either by the continuous or by the interrupted stitch. The great advantage of the horsehair suture is that it may remain for ten days before removal with impunity.

Now apply the dressing. The protective, dipped in the 1 in 40 solution, to destroy the septic property of any dust adhering to it, is applied over the wound; immediately over this is placed carbolic gauze in the form of loose-folded pieces, dipped also in the lotion, to ensure that it is actively anti-

septic when applied, for the dry gauze cannot be trusted in this respect; and over this the regular gauze dressing in eight layers, with a piece of mackintosh under the outer fold, of ample dimensions; remember the immense importance of having the protective overlapped well on all sides by the gauze. The protective, having nothing antiseptic in its composition, must be overlapped just as if it were itself a wound. The bandage of carbolised gauze is so arranged as to keep the edges of the dressings constantly applied to the skin. In bandaging the breast turns must be made round the shoulders.

*The protective.*—The attainment of the results seen under Listerism depends not only on the efficacy of the antiseptic measures used, but also upon the use of an efficient protective, as we term it, that is to say, a layer of material employed to protect the healing part from the irritation of the antiseptic itself; it consists essentially of oiled silk, varnished on both sides with copal varnish. The copal varnish is the principal agent in this protective for keeping the carbolic acid out; it is much less permeable to carbolic acid than oiled silk, although oiled silk itself is much less permeable to the acid than gutta percha or caoutchouc is. The copal varnish, then, is the most important of the ingredients of which this protective is composed; outside the copal varnish dextrine is brushed over (this is put on outside the copal) to ensure that the material shall take an antiseptic film when dipped in carbolic lotion.

If surgeons use the antiseptic agent, whatever it may be, in such a way as to act directly on the



tissues, they will necessarily have wounds more or less irritated according to the nature of the antiseptic they employ.

But, useful as a protective is in promoting the best kind of healing under an antiseptic dressing, I desire to say, by way of warning, that it would be infinitely better to use no protective at all than employ it amiss, for though at the risk of seeming tedious, I must repeat that in proportion to the efficiency of the protective in excluding the irritation of the antiseptic, is its power to exclude also its antiseptic virtue, and thus to conduct putrefaction inwards to the wound, unless it be overlapped well on every side by the really antiseptic element of the dressing.

*The gauze.*—The carbolic gauze used as a dressing. The proportion of the ingredients used are one of carbolic acid, four of common resin, and four of paraffin. The crude form of paraffin is sometimes employed in the manufacture of the gauze; it has the great disadvantage that it acts on the caoutchouc of the mackintosh cloth used in conjunction with the gauze, and soon makes it soft and useless. When pure paraffin is used the mackintosh will last for weeks together, and is thus in the long run the cheapest as well as perfectly trustworthy.

*Carbolic acid poisoning.*—I may say that we have had no carbolic acid poisoning. I believe the great secret of our comparative immunity from these toxic effects is that we avoid as much as possible all unnecessary action of the carbolic acid upon the tissues. Child and adult are treated alike, avoiding what is a common practice, after making a considerable wound, as, for instance, in amputation of the

breast or thigh, and as is often done on the Continent, viz. after stitching the edges of the wound together, and putting in drainage tubes, inject a 1 to 20 carbolic acid solution with the syringe through the tubes; in doing this, I should think it not at all unlikely that the patient might suffer from carbolic acid poisoning, because the interstices of the tissues just opened by the knife are ready to receive fluid that may be injected with any force towards them; and if you use a powerful syringe, and apply it to the orifice of a drainage tube with the purpose of clearing out the wound, the cavity will probably be distended by the fluid, and there must be a great risk of having it forced into the interstices of the tissues, and thence passing in by absorption into the circulation. This sort of practice is really quite unnecessary if you have a trustworthy spray, and operate in compliance with the conditions of our physiological problem from first to last, conditions not difficult to comply with if we know that they are necessary, and keep a proper watch. And, again, in changing the dressings there are many surgeons who whenever they change the dressings under antiseptic treatment, make a point of syringing the wound out. Here, again, is a most unnecessary application of carbolic acid to the system, and I believe the avoidance of this kind of practice is the principal cause of our immunity from carbolic acid poisoning.

At the same time I do not deny that in rare idiosyncrasies there may be carbolic acid poisoning in spite of the avoidance of needless introduction of the agent into the system. The patient begins to suffer, not only from dark urine, which is in itself a

matter of no moment, but from general debility, loss of appetite, and other symptoms of carbolic poisoning. If this should happen we must at once change the gauze dressing for one of boracic acid, and immediately the symptoms disappear; or the best at present known is the salicylic acid, it may be used in the form of salicylic jute, which is a pretty cheap material, and will answer the purpose as a satisfactory substitute for carbolic gauze. It must be applied in pretty large mass, and it will be well to have a piece of mackintosh outside, to prevent the discharge soaking directly through it.

#### ON THE CATGUT LIGATURE.

The value of the catgut ligature can be tested only by clinical experience, and I cannot refer better to this subject than to ask all who wish to obtain an accurate knowledge of it to read for themselves the admirable address made by Mr Lister, on his first taking the chair of the Clinical Society, on January 28th, 1881, and which appeared in the 'Lancet' of February 5th, 1881, page 201. Mr Lister there acknowledges "that hitherto the catgut ligature has been uncertain in its action, and therefore not entirely trustworthy, sometimes softening too soon and exposing the patient to the danger of hæmorrhage, at other times resisting too long the absorbent action of the soft tissues and inducing local irritation." With laborious research he endeavoured to find out the clue to this variation, and if possible to devise some mode of obtaining a ligature uniform in character and possessing all the qualities of the best

specimens of catgut hitherto prepared. The treatment to which Mr Lister subjects catgut, while simple, cheap, and rapid, is warranted to produce a thread, supple, very strong, that the large size No. 1, will bear a strain of thirteen pounds at least before breaking, which is more than can be employed by the unaided hands, and after soaking for half an hour in blood serum at the temperature of the body its breaking strain is only reduced to just over eleven pounds, of which a reef knot properly tied holds without any slipping, and which is slowly but surely absorbed by the tissues, neither yielding too soon nor remaining too long. The great strength of the catgut suggests that it may be employed for the ligature of piles, or of the pedicles of ovarian and other tumours, and have a value here second only to that of its application to single vessels.

As regards the mode of applying the ligature, says Mr Lister, "I have always used a single reef knot, with short cut ends, tying it sufficiently tightly to cause the giving way of the internal and middle coats." This latter point is not, indeed essential, but, he adds, "the injury done to the deeper tunics is, I believe, advantageous, by leading to a salutary corroborative process of repair. Why, it may naturally be asked, has my own experience with the catgut ligature been more satisfactory than that of many other surgeons? There are, I believe, two reasons for this: one is, that I have never ventured to tie an artery of considerable size in its continuity without having taken pains to ascertain that the catgut, was of thoroughly trustworthy material; and the other reason is, that I have adopted strict antiseptic means of treatment, not only during the



earlier stages of the case, but to the last. So long as any part of the wound remains unhealed, antiseptic treatment of the strictest kind ought to be employed. Even though the sore may seem to be superficial, there may still exist a sinus leading down to the site of the ligature, down this sinus a septic process may advance and invade the ligature, and, inducing unhealthy suppuration and ulceration, may lead at last to disaster from hæmorrhage.

“It is essential that the catgut should have proper strength, so as to bear any reasonable strain that the human hands can put upon it in the thicker forms; and it is not sufficient that it should be strong to start with. It is easy to get catgut strong in the dry state; it is necessary that it should be strong after steeping in blood serum for a while. It is necessary that a knot tied upon it should hold with absolute security, not merely in the first instance, but after soaking for an unlimited time in blood serum. It is further needful that it should not be too rigid, for it is possible for catgut to be over-prepared, in which case it may remain almost like a piece of wire among the tissues, and ultimately, perhaps, come away by suppuration in consequence of the mechanical irritation which it produces. But while the animal juices must be able to soften it sufficiently to render it mechanically unirritating, yet, on the other hand, it will not do for it to be too rapidly disposed of by absorption. If it is to do duty for a ligature of an artery in its continuity in the immediate vicinity of some large branch, it must remain for a considerable time of good strength unabsorbed, and when it is at length absorbed it is desirable that it should be removed in such a

manner that while it is reduced in thickness it should still, as long as any of it remains, retain its tenacity.

“Now, if we examine catgut in the process of diminution we find that it may be affected in one of two ways. If it has not been properly prepared, the substance of the catgut becomes converted in the course of a very few days into a soft pultaceous mass, which, when we examine it by the microscope, we see consists of the remains of the old cellular tissue of the submucous coat, with the interstices among these fibres filled with cells of new formation. The catgut tissue is infiltrated with young growing cells, and it is obvious it is this infiltration which is the cause of the softening. But, on the other hand, if the catgut is properly prepared, instead of being infiltrated by the cells of new formation, it is only superficially eroded, having exactly the characters that we desire for catgut required for the ligature of an artery in its continuity, viz. that till the last, even though reduced in dimensions, it shall retain its firmness and its tenacity. We know by experience that until nearly a fortnight has elapsed erosion does not begin; it proceeds gradually, and the thicker the catgut the slower does it proceed. We may fairly consider that from a fortnight to three weeks is long enough for the persistence of a ligature upon an artery in its continuity.

“But although the catgut prepared after the old method answers very well if it be of proper quality, there is this great objection to this method, that it requires a long time in order to produce the requisite quality. At least two months are needed to make the ligature at all trustworthy. It is better at



the end of six months, and still better at the end of a year. I possess catgut prepared in this way twelve years. Now, the length of time that the present method requires is a very serious objection. It makes the surgeon who has not prepared the catgut for himself, and kept it for a long time, at the mercy of the person who supplies it; and the person who supplies it, not being aware of the enormous importance of the question of time, if he happens to have run out of that which has been long prepared, will sell what has been only a short time in the preparing liquid, and is in consequence altogether untrustworthy.

“Catgut is prepared from the small intestine of the sheep. The gut is treated in what seems an exceedingly rude manner for so delicate a structure. It is scraped with some blunt instrument, such as the back of a knife, over a board; and by this means, as people express it, the dirt is scraped out. That which these people call the dirt is the exquisite and complicated structure of the intestinal mucous membrane. But while the mucous membrane is scraped out from within there is also scraped off from without the circular coat of muscular fibres. The result comes to be that the intestine is converted into a comparatively unsubstantial material, consisting of two bands, one more slender than the other. When the mesentery is stripped off by the butcher, the peritoneal covering of the gut shrinks into a narrow strip; and this with some longitudinal fibres, constitutes the more slender of the two parts to which the intestine is reduced by this process of scraping. The other part is the essential material from which the catgut is prepared, and this is neither more nor

less than the submucous cellular coat of the intestine. This coat of the intestine, which, in the sheep, has this extraordinary toughness, is the material out of which the catgut is prepared. For what the manufacturer calls the 'ones'—the thicker form of ordinary catgut—all that is done is to twist the entire tube by means of a wheel, like a rope in a ropewalk, up to a considerable degree of tightness, and then allow to dry. The essential thing is the twisting and drying; it can be prepared without the use of sulphur as well as without the use of potash. For the finer kinds the tube of the submucous coat is split up by means of razor blades, more or less numerous according to the degree of splitting required, connected with a coil piece of wood, which is pushed along the tube."

Mr Lister adds: "such, then, is the material with which we have to deal, you need not fear that catgut prepared by the old plan is ever over-prepared, and we possess in the carbolic oil (1 in 5) in which the specimens are kept a means of checking any mode of preparation that we may adopt, keeping it from that time forward not materially further prepared, while at the same time the large proportion of the carbolic acid to the oil ensures the catgut being maintained perfectly aseptic.

"The method of preparation which I have now the honour to bring before you is the following:—I dissolve one part of chromic acid in 4000 parts of distilled water, and add to the solution 200 parts of pure carbolic acid, or absolute phenol. In other words, I use a one-to-twenty watery solution of carbolic acid, only that the carbolic acid is dissolved, not in pure water, but in an exceedingly dilute solution of

chromic acid. But minute as is the quantity of the chromic acid, it exerts, when in conjunction with carbolic acid, a most powerful effect upon the gut. The first effect of the addition of the carbolic acid to the chromic solution is to change its pale yellow colour to a rich golden tint. But if the liquid is allowed to stand without the introduction of the catgut, it changes in the course of a few hours to a dingy reddish brown, in consequence of some mutual reaction of the two acids, and a considerable amount of grey precipitate is formed. If, however, catgut about equal in weight to the carbolic acid is added as soon as the ingredients are mixed, the liquid retains its brightness, and the only change observed is a gradual diminution of the depth of the yellow colour; the precipitate, which I presume still occurs, taking place into the substance of the catgut. As soon, therefore, as the preparing liquid has been made, catgut equal in weight to the phenol is introduced into it. If you have too large a proportion of catgut, it will not be sufficiently prepared; if you have too small a quantity, it may run the risk of being over-prepared. At the end of forty-eight hours catgut steeped in such a solution is sufficiently prepared. It is then taken out of the solution and dried, and when dry is placed in one-to-five carbolic oil; it is then fit for use.

“The strength of the catgut depends upon different circumstances. In the first place, sheep differ as to strength of their intestines, and the catgut maker, if he understands his business, will insist upon having his raw material of the proper kind. In the next place, the intestines must not be allowed to putrefy; they must be taken fresh. For these

things you must, of course, rely upon the maker of the catgut. In the next place, the liquid causes a certain amount of softening of the catgut, and if it is introduced in loose hanks, this will tend to produce a little uncoiling of the twisted cord, and a still greater degree of uncoiling will take place during drying. It is of great importance that this should not occur, because it involves weakening of the thread, and that in different degrees in different parts, and this may lead to the gut giving way when you subject it to a strain. The catgut, then, should be prepared on the stretch, both when it is put to soak and when it is put to dry.

“I need not enter into the mode in which this can be done by the manufacturer. I may only say this, that the surgeon who wishes to prepare it himself may do it in different ways. For instance, he may take two large test tubes, one a little larger than the other, and he may wind the catgut on the smaller tube, fixing one end by sealing wax, winding it round, and then bringing it up again, and fixing the other end with sealing wax at a higher level than the liquid will come to, putting sufficient liquid into the larger test tube and introducing the smaller test tube with the catgut wound round it, with a little shot to keep it down in the liquid. After forty-eight hours he takes out the smaller test tube and leaves it till the catgut is completely dry. I merely mention this as an illustration, and also as furnishing a hint to some surgeons in private practice who may desire to prepare catgut themselves, or a couple of gallipots, one larger than the other, will do just as well. But as I have already said, the principal uncoiling takes place during drying, and

for all ordinary purposes a sufficiently good article is got by putting the catgut loose into the liquid and putting it to dry on the stretch, by tying the ends of each hank to two fixed points in a room."



## CHAPTER II

### DEFINITION OF CANCER

THE word 'cancer' will probably long continue to be employed as it is now, and as it has been in years past, for all tumours which are undoubtedly malignant, without respect to their structural differences. It is likely still longer to retain its position as a popular term with the same signification. Some would use it as the substantive of the adjective malignant, but this has no advantage over the term malignant tumour; others use the Greek form carcinoma for the anatomical species, leaving cancer to be the clinical term; and this is at present a possible compromise, since we shall not for a long time prevent the use of the word in the two senses. It is impossible, however, to avoid attempting an anatomical definition. The best seems to be to classify and name objects according to their structural character, and to gain a key to the recorded experience respecting their properties. If we begin with physiological characters we are on less solid ground, for these characters may not be developed at the moment, and may never become so.

What, then, is meant by cancer?

It is a malignant growth, consisting of a delicate fibroid stroma, within its meshes, aggregated but not coherent cell-elements—cells, nuclei or granules,

generally uniform, though often similar to natural cell-elements. By malignant is meant that which tends to continued spread and multiplication irrespective of the tissue invaded, to progressive ulceration when near the surface—the analogous change in deeply seated tumours is softening—and ultimate poisoning and exhaustion and rapid decay of the system.

The characteristics above mentioned are not the tests of malignancy, they are rather malignancy itself.

A tumour may manifest none of the characters in question, and yet we may know from collateral evidence that it would go on to develop them if not interrupted by surgical interference or death. What name should be given to such a tumour? It is not at the time malignant. Many cases of cancer of the pylorus, for example, do not really exhibit the malignant properties described. But, we know that, if they did not by their situation cause inanition and early death, they would in all probability develop these characters.

These definitions are imperfect. Cancer is not of a necessity malignant, for it will sometimes retrograde, without showing any of the signs which we attach to malignancy. Under no circumstance would I limit the term malignant to cancer. Sarcoma, lymphoma, myxoma, and other forms of tumour are often as malignant as cancer, in some forms perhaps more so, and there are rare cases in which simple tumours also are malignant. The property of malignancy does not belong to any single type of growth, or even to several types, but is rather met with in several classes in unequal degrees.

The most malignant form of cancer is that called scirrroid carcinoma, next the round-celled and spindle-celled sarcoma, and with which I would put lymphadenoma; colloid carcinoma is malignant in a less degree, next come epithelioma, osteoid carcinoma, osteoid spindle-celled sarcoma, glioma, myeloid sarcoma, myxoma, and finally, the simple tissue tumours which are malignant only in the very rarest instances.

It is of consequence to determine the point of contact and divergence between cancer and other tumours, in respect to their behaviour as living growths, and between these generally and the normal structures of the body. Between cancer and other forms of tumour the one main difference is that its component cells are free, and that they do not present a uniform type (see Fig. 2). Practically we may agree with those who would regard any infectious growth as a cancer. But I believe that structural peculiarity is a main factor in that destructiveness which so specially characterises cancer; let us, therefore, limit the term "cancer" to those forms of disease which are specialised carcinoma (clinically including sarcoma and epithelioma). Whatever, then, determines the special forms of development of natural structure is in operation in the development of what we call morbid growths. The views which have been entertained as to the origin of cancer are various.

1. That a cancer tumour is the expression of a specific blood condition. 2. That a morbid material is present in the blood, which, coming into relation with an appropriate tissue, enters into combination with and causes the growth of the tumour. 3. That

the disease has its origin in the constitution at large, the tumour being only the local manifestation. 4. That the disease is in its origin purely local. 5. That, though local in development, there are general or constitutional conditions favouring its occurrence.

It is requisite to bear in mind the term constitutional as distinguished from local.

By local origin of cancer is meant the origin in a part or organ out of the elements of the tissue of the part, or some neighbouring part with the blood of normal constitution, or certainly free from any foreign morbid material.

By constitutional origin of cancer is meant the origin in a part, but in connection with some pervading element, whether that element be of tissue or blood, which will sooner or later find its local expression, in new growth, &c., which will, in its turn, be evidence of the constitutional state.

There are strong grounds for regarding cancer as a something more than a local disease; the all but certainty of its recurrence, remove it as we will; its heredity; its frequent association with other forms of irregular growth; its often rapid diffusion; its power of infecting the system—all, in fact, that we see in the life of cancer naturally leads to a belief that the disease must from the first be more than a mere local tissue change. And in one sense, and to a certain extent, this belief is well founded.

I have mentioned heredity as one of the grounds for regarding cancer as not a mere local disease. Cancer is, I believe, more frequently inherited than is generally admitted. It is not contrary to reason to conclude that the constitutional disposition, what-



ever that may be, is often present without the disease becoming developed.

If cancer be local in its origin, there is in some, possibly in all, cases a predisposition to the disease, which may possibly be distributed through the system, but which more probably has its seat in some among the tissues of the body.

I would question, therefore, the evidence of there being any special disease in the blood, which either alone produces cancer or co-operates with tissue specially fitted for the development of the disease, which if we receive it we must admit either that the same blood poison aids in the formation of simple tumours, or that each tumour has its own special poison.

Now, supposing that the blood were a poison holding fluid, we should expect, inasmuch as the poison must be present before the tumour which it aids in producing appears, that there would be some previous indication of such diseased blood state, but we have none.

Again, a growing cancer is removed, and the disease may never return, the patient remaining in perfectly good health. What are we to assume here if we adopt the doctrine of the blood disease? Is it that, though the cancer was growing, the removal took place at the moment when the blood poison had all been eliminated, or that the poison remained in the blood, but that the only tissue in a fit state to co-operate with it in the formation of cancer had been removed and hence no fresh cancer matter appeared? Either solution is difficult of acceptance; it is difficult to understand that though the blood must at first be in a diseased state, yet



that the cancer when it has formed may grow and spread, though the blood has returned to its natural healthy condition; on the other hand, it is difficult to understand that a patient may remain free from local disease altogether, though the essence of the disease remain in the blood. The cases are rare in which cancer has been removed once and for ever by operation; but those in which it has remained undeveloped for years after operation are by no means uncommon, and the same remark applies equally to them.

There is nothing which seems to contra-indicate the presence of a blood poison in cancer more than the well-known fact that the disease, after operation, rarely returns in any of the ordinary seats of election. Scirrhus of the breast, for example, while it returns constantly in the skin, in the connective tissue, in the lymphatic glands, and in muscle, seldom returns in the opposite breast. This is as true of cases in which there has been a long immunity after operation as of those in which the disease returns rapidly. Were the disease seated in the blood, should we not probably find recurrence in those organs which we recognise as the ordinary seats of primary cancer? The same remark applies to sarcoma of the testicle, to epithelioma of the lip or tongue, and to disease of symmetrical parts generally; surely, as more than half of all external cancers are seated in the breast, we should expect to find the second breast more frequently the seat of disease if the blood condition were a determining cause.

While, then, some of those characters which are usually present in blood diseases are wanting in

cancer, we do not meet in the latter with any which specially distinguish blood disease; surely the simpler view is that each tissue, each active element of that tissue, has its own vital property, and that the blood, a common fluid, is distributed to all alike, each taking and appropriating what it wants; of course it will be evident that the impairment of the nutrient fluid will cause an unhealthy state of the tissue to be nourished, but is it not also the case that if the tissue be impaired the purest blood will fail to induce healthy nutrition? What else is the meaning of the degeneration of muscle from disease? The pure blood is brought to it but it will not thrive. Let us pass to a simple tumour—a fatty tumour or wart. Here, in the one case we have a common blood circulating through all the fat in the body, but in one part there forms a separate overgrowth, due surely to some nutritive or formative change in the part; so in warts, the increased development of the cells of the rete mucosum must be due to the part, not to the blood. If the part is capable of initiating those changes which lead to tumour formation, why assume that in tumours which show more characteristics of tissue change that there must be some additional agency in operation outside the tissue?

“That the disease has its origin in the constitution at large, the tumour being only the local manifestation.”

The constitutional aspect is, then, a something which we are bound to call constitutional, and of which the locality in each case of cancer is determined by some other circumstance than that of inheritance; if this predisposition be called constitu-

tional, then we must hold both a local and a constitutional element as a necessary condition in every or nearly every case of cancer that comes under our observation, but we cannot doubt that there are some cases in which it is very difficult to discern anything like a constitutional element at all. And if we look at the regular series of morbid growths which can be traced without any apparent interval whatever, from the simplest forms of fatty or fibrous tissue up to the most marked forms of cancer, it may be very hard to indicate the point at which we could maintain that a constitutional predisposition or a constitutional element was introduced. We are bound to believe that in the long group of diseases which we call cancer there may be at one end diseases in which it is hard to discern any constitutional element at all, and at the other end diseases in which the constitutional element very far predominates over anything that we can suppose to belong to locality. We cannot over-estimate the importance of heredity in the origination of cancer. It is computed "that not less than one in three of all patients with cancer the occurrence of cancer can be traced in their families" (Sir James Paget); but this number does not nearly represent what we may very safely assume to be the predominance of inheritance in cancer. A large number of persons die of internal cancer, and convey it to their offspring, though it is never known that they themselves have been the subject of cancer, or at least never recorded it. A large number also die before they have transmitted the cancerous predisposition which is in themselves, for if a man has not outlived the whole age of man, are we not bound

to believe that he might not have been the subject of cancer; for cancer is eminently a disease of degeneracy, a disease of which the frequency increases as years increase. The cases are very far from rare in which offspring die of cancer long before their parents, but a few years elapse and then the parent dies of the very same disease that the offspring died of. It is not only constitutional diseases that are inherited, for local diseases are inherited with just as much surety as constitutional ones; let it not be forgotten, however, that there is a contrast between heredity of a local disease and heredity of a constitutional one. Herein the transmission of cancer accords with the transmission of all other hereditary constitutional diseases, with gout, with syphilis, with tuberculosis, with scrofula. The transmission of cancer by heredity accords perfectly with what we see in them, not what we see in a local disease, and this fact in regard to the transmission of a disease by inheritance is so all-important in respect of what we call its origin that it is necessary to be certain that the constitutional element of the origin of cancer is one of the most important points we have to study.

For instance, I do not think that the hereditary tendency to a cancerous disposition is identically the same as that heredity which leads to the development of a deformity. We see sometimes this sort of deformity occurring. We see children of cousins having club feet, or supernumerary fingers. It is not that form of hereditariness which we see in cancer. Neither is it that form of predisposition which leads to the development of a non-malignant local disease, as in the case of hydrocele. For



hydrocele has been known to occur hereditarily in a family, missing one member only, and that member a female. This, then, is an hereditary tendency to a local disease. It much more nearly resembles tubercle, if I might name one kind of hereditary disease which comes nearest to cancer. Notwithstanding all that has been done of late years to throw light on phthisis as arising from various causes—from catarrh, from pneumónia, and what not, it may be granted that it is occasionally and frequently an hereditary disease. And like cancer, phthisis sometimes descends in one side of a family only. Cancer occurring in a locality may remain dormant for a long time after its first development, as tubercle sometimes does. We sometimes have tubercle occurring, and the patient recovers after a time; the tubercle has gone, it aborts, it becomes latent, and by-and-by, at a distant period perhaps, sooner or later, the tubercle lights up afresh, and the patient has tubercular disease of the lungs. Cancer thus resembles tubercle in its local history somewhat and in its constitutional history generally.

Then next, if we watch the effects of injury in the production of cancer, we see very notably that it follows the same rule as it does in the production of others which we call constitutional diseases. Cancer, like others that we call constitutional diseases, sometimes appears, so to say, of itself; there is apparently so little provocation of it that we trace nothing that we call an exciting cause. But in a very large number of cases it follows injury, and sometimes it follows so quickly that it is impossible to disconnect it from the changes



which the injury has produced; either one of two things takes place, either a complete clearing up without any change of texture at all; or some inflammatory formation, some thickening, some hardening, some over-growth of some texture like the natural textures of the body. And when, after injury, there is a deviation from these ordinary changes, we seldom or never entertain a question but that the deviation is due to some constitutional defect in the person in whom it occurs, that deviation from the ordinary method of change after injury is because of some constitutional peculiarity in the person upon whom the injury has been inflicted. How otherwise to explain, but that the constitutional element in the origin of cancer is strongly marked in the constancy and in the method of its recurrence after operation, even after complete excision. Cancers do not fail, except in rare cases, to propagate themselves, which ever way we look at them; the facts of the method of propagation to distant and dissimilar parts are so strong on the side of cancers, that we must assume an essential difference between them and any other tumours that we might name; we must not deprecate in the least degree the constitutional element in the production of cancer.

Although bringing forward so strongly the constitutional element I do not in any way deprecate the local, no doubt the one or the other is predominant in different cases. If I must hold that which I suppose to be the more important of the two, I should believe that the constitutional is the more important, inasmuch as it is that which seems to predominate most in the largest portion of cancers,

in those therefore which we may best take as indicating the type of the disease. It is then of the first importance to decide whether cancer does owe its origin to a constitutional as well as a local condition.

Cancer is eminently a disease of degenerated tissues. We are wholly misled if we suppose cancer is a disease of healthy persons, whether by local degeneracy or general; it is essentially a disease of degeneracy. It increases in frequency in proportion to the number of persons living as age goes on. The apparent exception to this rule, is the very exception that proves the rule, for there are in women, without any analogues in men, two organs which enter into degeneracy, closely corresponding with the senile, at a comparatively early period of life—the breast and the uterus, and it is the predominance of cancer in the breast and uterus that alone makes the greater frequency of cancer in the female than in the male. If we separate the cases of cancer of the breast and the uterus, then cancer is more frequent in the male than in the female; but because these two organs cease to be capable of function, and enter, say between forty and fifty or thereabouts into a condition similar to senile degeneracy, therefore there is a rapid increase in the frequency of cancer at that particular age. But the breast and uterus of women at fifty should be compared, not with organs of men at fifty, but with organs of men at seventy, eighty, or ninety. It is solely this local degeneracy in women that make them constitutionally disposed to cancer long before it would be likely to happen to men.

That the disease is in its origin purely local.

That, though local in development, there are general or constitutional conditions favouring its occurrence.

Does the first cancer that appears in the patient's body generate the cancers which appear afterwards ?

Does it precede them in every way ?

If a cancer rises as a little patch in a person previously healthy, and expands itself throughout the frame, so that, poisoned by that one spot, the life of the patient soon becomes hopeless through the effects of that spot upon remote parts, then surely the surgeon will have recourse to the knife and as quickly remove the first spot that appears. Taking the purely constitutional view, and supposing that the general system is first charged with cancer, and that all cancers that appear are but outputs of this general store, why should we operate at all ? But really there is no opposition whatever between constitutional and local, to become local is really the very essence of being constitutional ; or, put it another way, that nothing is constitutional but what is local.

But recognise that cancer is a disease which ultimately kills by becoming general or constitutional, and which at first is local, then the question is, does the general condition precede the local, or does the local condition precede and cause the general ? We are cognisant of the facts, first, that cancer spreads in the part ; secondly, that cancer runs along the lymphatics to the glands ; thirdly, that cancer makes its way along the blood-vessels to organs remote through the medium of the circulation. An agreement in favour of the local origin of

cancer is this, that the first cancer that appears has a likeness of the part in which it appears, and the secondary cancers arising from the generalisation have the likeness of that first cancer. But, unfortunately, it is not all so clear as that, because, through the necessary imperfection of many post mortems, cases do continually crop up in which this cannot be made out. If the recurrence of cancer can be explained, and the way in which it does recur actually traced, then by leaving ever so small a portion in when you operate, by leaving a gland, by operating too late, that the lungs or other distant parts are already affected, then the operator must decide in his own mind whether or not the patient will be saved by the operation. But we have gradually come to the opinion that the removal of a cancer, when practicable, is the best treatment; that even if it does not delay the fatal termination, it is yet worth the patient's while to submit to the risk and trouble of operation with a view of removing a continual source of fear and misery.

## CHAPTER III

### THE ANATOMICAL ASPECT OF CANCER

AFTER passing in review the constitutional and local elements there is another, the anatomical, in which these cancerous diseases may be compared, of very great importance in their general result. Now, is it not the case the word cancer has often been meant to convey something extremely destructive, but which could not really be named until it had proved by its actual effects its destructive properties? Well, when it was found that growths which had these destructive properties could sometimes be recognised at a period earlier than these destructive properties became visible, then, of course, it was necessary that the object should be defined by the qualities or properties which were common to it throughout the whole of its existence, and not those which became developed after a certain time. Therefore arose a necessity for an anatomical definition and such an anatomical definition and classification of cancers and its allies will always be necessary. This is nothing new, because it is what was attempted at the very beginning of the century by Abernethy, who said he would classify tumours according to their structure. If it was objected that that was



not enough because you could not find out what their structure was till they were removed, also because their properties constituted a very important difference, still, he said, "All you can do is to classify things as you see them by their structure or general qualities, and then make notes of the propositions and dispositions which are attached to those structures." And that is really all that we can do now. It then resolves itself that we must have an anatomical definition of cancer. But with that anatomical definition is associated a certain feature of growth. It is to be presumed that all agree in describing a growth as cancer when, whatever its minute structures might be, it had already begun to infect or infiltrate a neighbouring part. Then of course it would be always clear that it could not be possible to exclude from the class growths that had not already done that, because you might find, and do often find, growths otherwise agreeing with cancer which have not yet arrived at that stage, but which for the most part might do so, and with most external tumours this is the case.

What does infection or infiltration mean? It has a distinct anatomical meaning, and it leads us to what is an anatomical definition of cancer. It is really this, that a change or growth, or something which began in one tissue, has passed over from that part in which it originally began to another which is adjacent to it, and not of the same kind, that is to say, that quality or mode of growth, or something which originally belonged to one tissue, has passed over to another.

I imagine that anatomically one can give no better definition of cancer than that there is a kind

of duality in its structure, that one part of the structure, looked at anatomically, is of one kind, and another part is at all events different, whether actually of another kind or not—another kind essentially, at all events it is different in some respects. What does this simple fact mean? It means this, that when any disease or change has once bridged over that very narrow but very important interval which separates tissues of one kind from tissues of another kind, it is almost as good as if it had already spread all over the body, because there is no longer in the whole course of its transmission through the body any barrier nearly so complete and incapable of being crossed as that which it has already passed. It explains the old characters in scirrroid carcinoma which are so much relied on by surgeons, of adhesion of skin, etc.; it means that something which did not begin in the skin had got to the skin, and having got to the skin may go anywhere else. Therefore this original property of infection, which includes essentially the dispersion all over the body, is in one sense an anatomical fact. Of this anatomical fact, this passing over, this morbid change from one part of the tissue to another adjacent tissue, there are many explanations. It has been explained as a matter of simple growth. It is explained in the case of epithelioma as a matter of growth: that the skin leaves its proper site and grows inward. The same explanation is extended to other forms of growth: again, a growth in one kind of tissue infects or causes a different kind of growth in the adjacent tissue. Now in these views there might be something much more delicate than cell-life—

something coming out of the cell, but infinitely smaller and more refined. In a great number of cases it is clear, whatever the material is that stirs up the new growth, that it is transmitted through the body in attachment to cells. If this is the case, we have here a constitutional theory of cancer which deserves that name at least as much as tubercle, and as much as syphilis, in which something is introduced from without. At the same time it is something which is so far material that it is always attached to local growth, and therefore is, we will say, essentially local. In this sense it might bear both terms, constitutional and local.

With regard to the hereditary condition, we have separated the common argument drawn from inheritance, and given it a far more definite name. Commonly it is urged that cancer must be constitutional because it is hereditary; but it has been shown that it must be constitutional, if constitutional at all, because it is hereditary, only because it is hereditary in a certain way. Then what is inherited must surely be, not anything absolutely separable from a body, and therefore in the nature of a poison, but something with some property of tissue; and if these characters are extremely minute, that surely is the misfortune of histologists, not their fault; but until we have a precise enumeration of all the minute characters of tumours, it will not be possible to construct text-books and works of reference in such a way as that we shall know precisely to what we are referring.

Is there any essential difference between cancer and other malignant growths, or between these and any tumour whatever? I mean, of course, genetic-

ally, for structurally there will be differences in abundance, and in behaviour perhaps still more. We may take lipoma: we find that in the midst of the ordinary fat of the body a separate mass is developed, which continues to grow indefinitely, which may at last thin the skin and cause its ulceration. We find that the tendency to this form of tumour is sometimes hereditary; that sometimes there are two or many more; that sometimes they are recurrent. The tissue is of pure fat, and we cannot detect any difference between it and the ordinary fat in which it is imbedded. But there must from the first have been some property in the tissue from which the fat was developed different from and in excess of what existed in the normal fat layer. Here the history of fat tumour ends; nothing more comes of it. We recognise the fact that the more the structure of a tumour resembles a natural structure the less is its power of doing harm. This is especially the case with fat cells, which, when once formed, cease to perform any active function; but, it may be said, there is an essential difference between a cancer and a lipoma in regard to similarity to natural tissue. Histologically there is, but as to mode of genesis there need be none. Admit that the elements of any tissue may take on independent action, and no line can be drawn between the mode of origin of the simplest and the most malignant of tumours.

We may take another tumour, enchondroma. Here springing up usually, though not always, in a part in which cartilage forms, or has formed one of the natural constituents, we find a tumour that may grow indefinitely, and which often remains, like a



lipoma, fixed to its original seat of growth. The texture may be at first indistinguishable from pure cartilage. So far, there is no material difference between the modes of growth in a lipoma and an enchondroma. But a cartilage tumour, having once formed, may go on to further changes. There may be from the first an indication of some difference from the normal cartilage. Instead of remaining stationary as cartilage, it may go on to form bone, or may break down into cavities containing nuclear and fibrillated, and jelly-like substances; and then we may have dissemination to any extent. The original tumour may have become converted into a cystic growth, more sarcomatous than enchondromatous in its character; but the secondary growths will often revert to cartilage structure, while sometimes they will appear as sarcoma. It is not difficult to understand why an enchondroma differs from a lipoma. The fat cells of a lipoma have reached their full term of activity; cartilage cells are multiplying and active. In the disseminating tumours there is no cyst; their elements can become free, and may get into the lymphatics or blood-vessels, and be transported to distant parts and grow there. We may have all the varieties of activity of growth, from the nodule of cartilage which goes on to form a simple exostosis, to a structure in which cells seem to be set free from all restraint as to number, or form, or change of character. In these latter cases we get into the region of malignancy; but who can draw a line separating a class which resembles lipomata in simplicity from those which are allied to cancer? We have no proof of the power of natural cartilage cells to increase and multiply when detached



from their natural position ; but we have it in the case of the allied structure-bone.

It is certainly impossible to say why one enchondroma should remain as pure cartilage and another go on to softening and dissemination. It is, we know, the tendency of tumours to 'deviate from those fixed laws of growths which regulate the size and form of our natural structures. Even tumours most resembling natural organs show this. An adenoma of the breast, for example, may vary in character from a compact gland-like structure, indistinguishable from that of a natural mammary gland, to a soft flickering substance containing proliferating cysts and merging into a cystic sarcoma. Surely, in such cases one can only recognise a disposition, more or less pronounced, to perverse development in an atom of natural tissue. No one would, I presume, consider a special quality of blood necessary to account for them. But the fat tissue, or the cartilage, or the gland-like substance will grow alike indefinitely and irregularly, and their ultimate texture may present as many deviations from that of natural tissues as does their gross mass. And so with regard to sarcoma in all their varieties ; they do not differ more from forms seen at one time or another in natural development than do enchondroma or lymphadenoma in their advanced stages. Many of these prove to be fearfully malignant ; their elements will be carried away and form new centres of growth, and destroy their possessors as early as will carcinoma. But what line can be drawn between perverse local development and this development plus blood poison ? Can it be said that there is something in cancer which is not contained

in those other forms of infecting disease which I have mentioned? Surely not; for though carcinoma may, as a rule, contaminate the system more certainly and thoroughly, yet as much cannot be said for epithelioma, and it does not apply at all to rodent ulcer, which, according to all recent authorities, must be regarded as *only* a modification of epithelioma. As we shall see, the mere structural peculiarities will explain the differences in the degree of malignancy found in the various forms of cancerous and other tumours.

In most cases the first notice we have is the appearance of a tumour, and in those of internal cancerous or other allied tumours the new growths may have attained a large size, and have spread and infected other parts before any sign is shown of their existence. This is widely different from what we see in blood diseases generally, in which some symptoms, inflammatory or other, precede or immediately follow the outbreak of local disorder. But what symptoms of cancer in its early stages can we find beyond those afforded by the mere existence of the tumour itself? Is it not rather the case that our suspicions are aroused by the very insidiousness of the local disease? There are some things, indeed, which do make us suspicious of a cancerous future; but they are purely local conditions, and may exist for years before any real malignant disease shows itself.

## CHAPTER IV

### ON INFECTION OF NEIGHBOURING AND DISTANT PARTS

WE may come now to the question, Why should malignant growths, some cancers especially, when once formed, infect neighbouring and distant parts, and ultimately contaminate the system? The knowledge we have of late years acquired of the independent actions of cells renders a solution more easy, though I admit that it is not free from difficulties.

It has long been known that cells are dispersed around a cancer tumour, the direction and rapidity of the dispersion varying according to the density of the tissue, and the abundance of connective-tissue spaces or of lymphatic or vascular networks in which it lies. Cancer cells show amœboid movements, and can thus travel independently in tissue spaces, or even penetrate delicate membrane. There is no doubt that these cells, whether the matter that forms their nuclei or the free granules, are the active agents in the reproduction of cancer. We can understand that these cancer germs may thus travel through their own power, or be carried along in the vascular systems or connective spaces in every possible direction. And it must be remembered that cancer is for the most part a structure infiltrating itself among the tissues in which it lies, not surrounded by a capsule or limitary membrane of any sort, as

are so many non-infecting tumours. The newly-developing and active cells are always in direct contact with the healthy tissues on which, in fact, they are living. Once set free, the cells may travel as indicated. First, they may travel along the lymphatics to the glands, forming new centres of growth, and by continual invasion affect a series of them, and perhaps contaminate the lymph itself, or, secondly, they may travel through the surrounding tissues, their direction being often determined by the density of the tissue. Thus it is often noticed that after breast operations, the disease will reappear above or below the cicatrix and will travel on the same plane, not passing across the dense cicatricial tissue. The disease will seem to prefer the easier course, but the densest tissues will not prevent this permeation. In malignant intra-ocular growths the germs are found at times extending through the dense sclerotic and then bursting out into new growth in the free peri-ocular structures; thirdly, they may pass into blood-vessels, and thus into the general current of the circulation, hence we may get infection of internal organs, or of parts widely removed from the original tumour. We have evidence of this mode of conveyance in many recorded cases of carcinoma and sarcoma; and the secondary cancer growth found in the lung and liver (so like in many respects to the deposits we get in pyæmia) point to the same mode of extension. Besides we have evidence of conveyance in free cavities by gravitation and sometimes of implantation by auto-inoculation.

There are some tumours of which the elements are disseminated far more rapidly than are those of



cancer. On the other hand, some cancers show little tendency to dissemination. A small melanotic sarcoma will often give rise to numberless secondary growths in a marvellously short space of time. This is, perhaps, due to the great activity of growth and the abundance of granular matter which often characterise this form of tumour. If we look to epithelioma, on the other hand, we see that great and destructive as may be its local action, yet its area is usually limited to the first part invaded and the contiguous lymphatic glands. The structure explains this. The component cells are coarser, have less independent movement, are more packed together, sometimes becoming coherent—they may pass into the lymphatics—coarser matter will do that—but like the cells from which they originate, they are little disposed to wander; the tumour grows more by continuity, less by dispersion. This is still more marked in rodent ulcer, where the cell activity is at a minimum and the ulcerative keeps pace with the formative processes.

Admitting that cancer, like other infecting tumours, is reproduced by growth of germs which have been conveyed from it to distant parts, the question arises, how can we account for the fact that after removal there may be no reproduction for years? Can it be imagined that during all this interval the germs of disease deposited from the original tumour have remained inactive? Is not this contrary to the nature of cancer, and does it not show that there is a cancerous poison in the system? Cancer and other tumours may remain in a rudimentary state for an indefinite length of time. In the case of recurrent cancer we often see



that an enlarged and hard gland, which is left after the removal of the main tumour, will remain quiescent for years and then active growth will set in. The same will take place in a cicatrix which has, perhaps, remained hard. There are many facts, both in normal and morbid development, indicative of the possibility of tissue remaining unchanged for long periods, and then taking on new phases of growth.

It is not improbable that what is seen as a result of advancing degeneration often plays its part in cancer development. It is probable, though it may not admit of proof, that in these cases which are so common of hereditary lipoma, or sebaceous or dermal cysts, the rudiments are present from the first. We know, as a fact, that such tumours will remain small, only just perceptible, perhaps, for twenty or thirty years, and will then take on an active growth. In the imperfect structure of an inefficient mammary gland, or of an abortive testicle, is there not present from the earliest period some form of indifferent tissue prone to irregular development, but quiescent during the active periods of life? This is rendered the more probable from what is so frequently found in connection with epithelioma. We have here on the surface what may be hidden in the case of the deeper glands. Scales, warts, or moles, and some imperfect epithelial growths, may remain without change for forty or fifty years and then become the seats of a cancerous growth. If such a scale, or other imperfect tissue, were persistently irritated, it would doubtless become cancerous at an earlier period. Cancer has been there potentially for years, but its time has not come. Surely this is the explanation of the

fact that cancer germs which have wandered from the parent tumour may remain quiet for indefinite lengths of time. I can see no other way of accounting for such a case as this. A tumour is removed—a year afterwards a small nodule, not so large as a split pea, is discovered and removed, no other nodule being perceptible after careful search. After another long interval another small nodule is found and removed, and again there is quiescence. This may again be repeated.

While it may be probable that the germs of cancer may thus remain in a sort of dormant condition for long periods of time, it does by no means imply that there is not in cancerous patients a special disposition to tissue change located in some, but not in all the structures of the body. The general tendency to degeneration may give rise to the primary local change; so may local irritation; but whatever may be the local condition which determines special tissue-change, whether its seat be in the parenchyma or in the nervous system, the same may possibly determine a preference for deposit or degeneration under the conditions of progressive cancer.

Another remarkable and not very explicable phenomenon is the arrest of cancer growth and the gradual wasting of the diseased mass. This is an occasional event which is very important, as it encourages us to hope that a cure may yet be found for the disease. That this arrest or recession is not due to any exhaustion of the cancerous element in the body is shown by the fact that, while the disease is retrogressive in one part, it is in active growth in another. The retrogression differs from the degeneration of the earlier formed cells, which is

constantly going on in the interior of tumours, as shown by the presence of fat-granules, compound granular cells, and such like. In the case alluded to, the activity of the whole mass is arrested, new cells cease to be formed, and the tumour fades, we must look for some cause.

For cancer is so far like a parasite that it draws its nourishment largely from the tissues in which it lies. For example, a nodule of carcinoma or sarcoma is detached and floated off in the current of the circulation and afterwards grows in the lung or the liver, it must in the first instance obtain its nourishment from surrounding tissues. Does this recession of cancer take place in obedience to the law under which local atrophy, independent of inflammation or disease, may occur? or may it be due to some want of organising power inherent in it from the first? as some cancers seem born to be atrophied.

As the most important element in nutrition, both in health and disease, is the activity of the tissues themselves, the supply of nutritive material, although an essential, being merely a passive part of the process, it becomes necessary to consider, somewhat minutely, those parts of the tissues in which this activity resides. Grant it then, that the cell is the seat of nutrition and function; and further, that each individual cell is itself an independent organism, endowed with those properties, and capable of exhibiting those active changes which are characteristic of life. Every organised part of the body is either cellular or is derived from cells, and the cells originate from pre-existing cells. Whilst therefore, the whole body is made up of cells, or of sub-

stances derived from cells, and the cell itself the ultimate morphological element which is capable of exhibiting manifestations of life, it must be borne in mind that in a complex organism, the phenomena of life are the result of the continued activity of innumerable cells, many of which possess distinct and peculiar functions, and that by their combination they become endowed with new powers and exhibit new forces, so that although each individual unit possesses an independent activity, it is in a constant dependence upon others with which it is more or less intimately associated.

In embryonic cells, in those of many rapidly growing new formations, and in the cells of blood, pus, and mucus no limiting membrane can be demonstrated. It would thus appear probable that a simple mass of protoplasm (germinal matter or bioplasm) may, in some exceptional cases, be all that is necessary to constitute a cell, namely, an elementary organism, capable of exhibiting independently all the phenomena of life; but that the nucleus is an exceedingly constant and almost invariable constituent. The cell-wall is much less constant, and being the result of a retrograde change in the outer layers of the protoplasm, it must be regarded, in point of vitality, as inferior to the rest of the cell.

The germinal matter or protoplasm itself is an unstaple albuminoid compound, which is insoluble in water and coagulates after death; as usually met with, it is a homogeneous structureless material, of a soft and viscid consistence. In consistence, however, it is subject to variations, being sometimes perfectly fluid, at others more or less solid and



gelatinous. In old cells it often becomes transformed by loss of water into a more solid albuminoid substance. This keratin occurs in the epidermis and nail. Protoplasm may also become gradually converted into other modifications of the protein group. The cell-wall, when it exists, is of much firmer consistence than the protoplasm. In some cells the protoplasm constitutes but a small proportion of the body of the cell, other substances, which are either the result of its metamorphosis, or have been taken up from without, being associated with it; thus fat is met with in the cells of adipose tissue, pigment and calcareous particles are also met with in cells.

The nucleus is more constant both in size and form than the cell. It is usually spherical or oval in shape, and often contains one or more minute round or angular bodies, termed nucleoli; it offers a greater resistance to chemical reagents than the other constituents of the cell, and in disease often remains after these have been destroyed. It is also more deeply stained by carmine.

The nucleus in its original form is vesicular. In the earliest cells of embryonic tissue it possesses a delicate membrane enclosing a nucleolus and fluid contents, thus resembling in its structure the cell. Subsequently, however, it loses its vesicular character, and, as usually met with, it is a solid, perfectly homogeneous, or faintly granular body, in which the nucleolus is still visible. The recognition of the nucleus is not always possible owing to its presence being obscured by fat, pigment, or other substances contained within the cell. In some cells the nuclei gradually disappear, but it must be



mentioned that several nuclei may be contained within the same cell.

The cell is capable of absorbing and transforming matter, of excretion, and of growth. It is also endowed with the power of changing its form, of cohering with other cells, of undergoing more or less active movement, and of reproduction.

The question now arises as to what part is played by its active constituents—whether the cell-wall, the body of the cell (germinal matter, bioplasm, protoplasm), and the nucleus have different offices.

The cell-wall, being the result of a retrogressive change in the protoplasm, cannot be regarded as taking any part in the life of the cell, the activity of which is much diminished by its existence, as is also its power of reproducing itself by simple division. It is in old cells that a cell-wall is most frequently met with, in those newly formed it is entirely wanting.

The nucleus has usually been looked upon as the seat of the nutrition, as distinct from the specific functions of cells, and has been supposed to play an important part in their multiplication and reproduction. The fact that when a cell divides, the division usually commences in the nucleus, and only subsequently takes place in the rest of the cell, would appear to favour this view ; as would also the great uniformity of the nucleus both in size and form, whatever be the functional nature of the cell. It must be borne in mind, however, that non-nucleated cells may multiply, and that nucleated cells have been observed to divide, the nucleus itself taking no part in the process.

Whatever be the part played by the nucleus there

can be no doubt that the protoplasm is the most important factor of the cell, and it may itself be the only constituent. The spontaneous movements, alterations in form, and migratory powers characteristic of young cells, are due to the protoplasm. Such movements are observed in the cells of the embryo, in lymphoid and young epithelial cells, in some of the cells of connective tissue, and in white blood- and pus-cells.

The protoplasm may be the sole seat of the nutritive and formative power of the cell. It would appear, however, probable that it is more especially concerned in the performance of function, and that the specific functional peculiarities of cells are dependent rather upon it than upon their other constituents. The volume and consistence of the protoplasm vary in different cells, and in the same cell at different times, and under different circumstances. It is apparently capable of imbibing and giving up fluids, at the same time undergoing corresponding alterations in volume. These considerations render it probable that it is the seat of the selective power of the cell, and of those other properties which represent its specific functions.

The multiplication of cells may take place in three ways—by simple division, by gemmation, and by endogenous growth.

In the first two methods the cell breaks up into fragments; in the last, new cells originate within the parent cell. The process is obviously associated with growth and increase of protoplasm.

The multiplication by simple division is the most frequent method. The cell divides and forms two cells, and each of these again divides and forms two

more, and so on. In nucleated cells the nucleus as a rule divides first. The nucleus, however, may divide and multiply within the cell without any division of the cell taking place. If the nuclei multiply within the cell, and the protoplasm continuously increase without subsequent division of the cell taking place, large, many nucleated, irregular-shaped masses of protoplasm are produced. These are the giant or myeloid cells, which are met with in the medulla of young bone in myeloid sarcoma (Fig. 14). The existence of a dense cell-wall interferes with the process of multiplication by simple division.

By endogenous multiplication is understood the development of cells within pre-existing cells. The multiplication of the cells of cartilage, such as occurs in the growth of bone and in the process of inflammation, has been adduced as an example of this mode of cell formation. Here, however, we have simply the division of the cartilage cell within its capsule, and the process is precisely similar to multiplication by simple division—vacuolation, of Virchow. The process consists in the formation of a vacuole in the body of the cell. This vacuole may gradually increase in size, until it occupies nearly the whole of the cell, being merely surrounded by a thin layer of protoplasm, in which may often be seen the displaced nucleus. Within this vacuole one or more new elements are formed. These either originate from the nucleus of the cell, or they are produced from the protoplasm which forms the wall of the vacuole.

The endogenous mode of cell formation is not that by which tissues regenerate themselves. This

is usually effected by simple division. Elements which have an endogenous origin have commonly a destiny different from that of the parent cell.

In multiplication by gemmation, a small portion of the protoplasm projects from the cell, and becomes detached by constriction at its base, thus forming a new cell.

In the present state of our knowledge of the cell structure of cancer (carcinoma), excepting the epithelial, we may find cells approaching the globular form, but deviating from it in some particular, as though the globe had been submitted to pressure, and its walls had bulged out, giving it the appearance of a tadpole, of a kidney, or a branched appearance. Whatever shape it may have attained, the cell always contains one or more nuclei, and these again nucleoli (Fig. 2). The cell of an epithelioma is an irregularly-shaped epithelial cell. It has lost its natural circular appearance, has probably obtained branches like the cell of the other cancers, or irregular round its border; it has its nucleus and nucleoli (Fig. 17).

When these deviations from a healthy cell are found in a tumour, the case is one of cancer, but the value of this diagnostic sign is unfortunately marred by two significant circumstances, the necessity to form a decided opinion as to the nature of a tumour before it is possible to place it under the microscope, and the fact that tumours which have been removed and have not yielded under the microscope the especial cancer cells, have nevertheless returned and destroyed the patient in the very same manner that cancer does its direful work.

Although there are these two great and important deficiencies in the completeness of the diagnostic

value of the microscope, the information it affords enables us to devise and pursue a plan of treatment which has for its basis an exact knowledge of how this destructive disease is propagated in the system, a knowledge which was only guessed at by our forefathers. It is a fact established by experiment, that cancer cannot be communicated from one person to another as may fever or syphilis ; very occasionally it happens that a wife may have epithelioma of the uterus, and the husband epithelioma of the penis, but it is so rare a combination as to amount only to an accidental occurrence. It is not then a poison which may be implanted in the system and give rise to the diseased structures we are contemplating.



## CHAPTER V

### NEW GROWTHS

THIS group, called true growths, includes all new forms in the shape of a more or less circumscribed mass of substance resembling the tissues of the body in a mature or an immature state, also carcinomatous and sarcomatous tumours and combinations of all these forms.

The chief fact which all these growths have in common is the fact of growth or increase, which appears to be in a certain sense independent of that of the body, as if the tumour had some separate life of its own. The idea of a separate life is untenable, and no one can doubt that a tumour is essentially a part of the body. Whether a tumour starts from a simple cell or germinal centre we do not know.

When we are able to examine the process, we find germination taking place from several points, but they may originate from one.

Virchow lays down the general principle that all new growths pass through a stage comparable to the undifferentiated cellular condition of the embryo. This he calls the stage of indifferent cell-proliferation, in which all elements are alike, whatever form they may be ultimately destined to assume. And this indifferent cell-proliferation is an undoubted

fact: we may see it at the margin of every growing tumour (Fig. 4). Nor need we hesitate to allow that, as the earlier stages of all animals have a considerable resemblance in structure, so have the earlier stages of all tissues. The rete mucosum of the skin has a structure as indifferent as that of granulations. The difficulty is to allow as great a faculty of differentiation to this granulation material as to the true embryonic tissue. Virchow states that in certain tumours a part of the original elements becomes converted into connective tissue, another part into epithelium, till a complex structure is produced like that of an organ of the body, *i.e.* a sort of pathological organ or organoid tumour. He also describes a class of teratoid or monstrous tumour which represent not an organ only, but the whole system of the body. Such a development, he says is not more difficult to conceive of than that of simple tissue tumours. It is, however, very doubtful whether the class of organoid or of teratoid tumours can be shown to originate in a stage of indifferent granulation cells. It is doubtful whether organoid tumours are anything else than a development or enlargement of some previously existing parts, unless, as sometimes appears, they are composed of two kinds of tissue—for instance, of vessels and an epithelial covering, which are evidently of different origin. The rare class of teratoid tumours appear to be, generally speaking, instances of inclusion of a part of the integument at an early period of development, or they are comparable to an imperfectly formed foetus; at all events they are apparently in all cases congenital, with the possible exception of some growths in the ovaries. Such a

mass must be regarded as part of the products of the original congregation by which the organism was produced, and not of the secondary process of growth set up after its completion. There are other tumours which may be supposed to bear the same interpretation, namely, mixed tumours, such as those composed partly of cartilage and partly of fibrous tissue, which do, undoubtedly, pass through a stage of indifferent cell-formation, since this indifferent tissue is found to pass by insensible gradations into each of these forms. But in these tumours all the tissues belong to one class—the connective-tissue series—which are physiologically interchangeable. In another class—namely, cancers, we find, it is true, two types of elements: the stroma (Fig. 1) which is connective-tissue structure, and the cells, which often have more or less of an epithelial character (Fig. 2). If both parts arise from an indifferent cell formation this is of course comparable to the differentiation of embryonic development, but this is a question of extreme difficulty. At present we may take it provisionally as not being proved that indifferent cell formation does give rise to both classes of elements in these tumours. From all these we must conclude that the process of tumour formation is analogous to that of embryonic development, so far as both processes result in the formation of a mass of indifferent or similar cells, but beyond this the parallel is less exact.

Referring to hypertrophy, the formation of new growths has doubtless many points of contact with the process by which existing parts of the body are increased in size. The parts which are specially disposed to hypertrophy are, with certain exceptions,

also very liable to become the seat of tumour formation; as, for instance, adipose tissue.

The largest tumour on record is a fatty one, of which a drawing is preserved in the museum of the Harvard University, Boston, and which, at the time of death of the individual, is said to have weighed 275 pounds, while the patient without it was estimated at less than 100 pounds. It grew chiefly from the hip, and was of such enormous size that the patient was condemned during the latter part of her life to absolute inaction. This tumour illustrates several of the laws of new growths which I have endeavoured to trace. It arose in a tissue specially disposed to hypertrophy; it arose in a part of the body where hypertrophy of this tissue is particularly liable to occur; and, from its causing absolute rest, even the ordinary waste of fatty tissue which occurs from the movements of the body was reduced to a minimum.

Not only are special organs, but even special parts of organs, which are liable to hypertrophy, are also liable to become the seat of new growth. Enlargement of the lymphatic glands is well known to be an exceedingly common affection of the body. The structure of glands thus enlarged is not generally different from that of a normal gland. In a similar class of cases we have glands, which in outward appearance are simply enlarged, but which, nevertheless, differ both in minute structure and in their history. Either the newly formed gland decays, in which case we call the tumour scrofulous, or it becomes hard, loses somewhat of its cellular elements, and shows an increase of the fibrous element. Then there are cases in which by inflam-



mation and thickening of the capsules and connective tissues a group of glands become adherent, and a lobular mass is formed which may be regarded as a tumour (lymphadenoma or Hodgkin's disease). Our powers of observation do not permit us to draw any fixed line between the two cases.

There is a third class of cases in which the enlarged glands are in direct communication with masses of newly-formed tissue around them, which penetrate or infiltrate the neighbouring parts, and convert them into similar structure. This we call an infective or a malignant tumour. Yet there are such cases in which the structure of these adventitious masses differs little, if at all, from that of a normal gland. These instances may suffice to show that hypertrophy passes, by insensible degrees, into a condition resembling the most pronounced forms of new growth, both in their distinctness and in their generalisation, and even in their infectiveness. Whatever the mechanism may be by which hypertrophy is produced, cell proliferation and multiplication takes a very important share in it. It is therefore desirable to inquire what are the minuter changes by which this increase in parts is effected, and whether these minuter changes, as well as the larger features of hypertrophy, are also comparable either to those which are concerned in embryonic development or to those which are concerned in the production of tumours. Enlargement of organs appears to be partly effected by increase in size of the elementary parts and partly by the multiplication of those parts. The latter process, which has been called hypercrasia, is no doubt the more important. It is not always easy to get precise



observations of these changes in an early stage; but in hypercrasia of connective tissue it is evident that the first step is the multiplication of nuclei. This is the process referred to as indifferent cell formation. We may conclude that a hyperplastic process, or one involving cell-proliferation, is the chief factor in hypertrophy as it is in embryonic development in repair, in inflammation, and in the new growth of tumours. The element common to all these processes is one which is also normal in certain parts of the body, and connected with the process by which certain fundamental changes are effected.

Tumours which are not like normal tissues are called heterologous or malignant. Distinctly heterologous tumours form two great divisions, namely sarcoma and carcinoma or cancer. Sarcomatous tumours are essentially embryonic, representing early stages in tissue formation, parts of which are often found passing by gradual transition into simple tissue. But it is only tissues of a certain kind—the connective-tissue series—that show this transition. Cancers are more different from the tissues in which they arise, and are not, strictly speaking, like any tissue of the body. They partially resemble glands in having a compound structure, in comprising cells, which are not unlike secreting cells in shape and appearance, and in having these cells enclosed in a sort of fibrous framework or stroma (Fig. 1); but, as compared with a normal gland, the arrangement is extremely irregular and confused. If cancers could be compared with gland tissue, or be shown to proceed from it, like glandular tumours, they might be described as not entirely heterologous with their matrix. The majority of such tumours do arise in

or near glands—the most familiar of all examples is seen in cancer of the breast—or they grow on surfaces which are richly supplied with small glands, as the epidermis or mucous membrane. Hence it has been concluded that all tumours strictly called cancer do originate in epithelial surfaces or in organs containing glandular epithelium, differing from simple epidermic structures and from glandular tumours by the unrestrained character of their growth.

Does there exist any notable difference in the physiological or pathological behaviour of the two classes of tissues, epithelial and non-epithelial? No organ of the body is formed entirely of elements derived from one. In a gland, for instance, the glandular cells will come from one and the connective-tissue framework from another. Hence we get the distinction in many organs between the stroma and the parenchyma, the latter being in general the specific or peculiar elements of the organ, the former the framework or scaffolding by which they are supported. We have not, then, to compare organs so much as the parts of organs, and in so doing we find that this fundamental distinction extends in some degree to their chemical products and to the physiological and morbid reactions to which they are subject.

It is certain that epithelial structures never give rise to a new growth of vessels. Whenever vessels or vascular growths project from such a surface they are derived from the subjacent connective or vascular tissue. Epithelial tissues, again, never give rise to fibrous tissue. This is seen in the case of wounds in the intestine, where union never takes

place on apposed mucous surfaces, but only when the serous surfaces are brought together. Again, granulations never grow upon the skin or upon the mucous surfaces until the whole, or nearly the whole, of the epithelial layer has been removed. It is clear also that no bone, cartilage, or any other form of connective tissue is ever produced upon such surfaces.

## CHAPTER VI

### EXAMINATION OF TUMOURS

BEFORE discussing in detail the several varieties of malignant growths, it may be well to dwell upon the importance of examining tumours by means of thin sections of hard specimens rather than by scrapings from the fresh surface.

I will not attempt to introduce here an account of the various processes by which tissues may be prepared for the careful examination of their minute structure, but I may mention the simplest way in which one may proceed to examine the structure of a tumour. The necessary apparatus comprises:—1st. A solution of chromic acid (20 per cent.), or a saturated solution of picric or carbazotic acid made with cold water. 2nd. Pure glycerine. 3rd. A case containing needles for teasing and lifting small pieces, fine scissors, a razor, or a Valentine's knife, for making thin sections. 4th. A few bottles of test fluids, either for dissolving away fat, mineral-acid for clearing of calcareous particles, acetic acid for rendering nuclei more distinct. 5th. Beale's carmine staining fluid, prepared as follows:—Half a drachm of strong liquor ammoniæ is added to ten grains of carmine in a test tube, and gently agitated over a spirit lamp until boiled for a few seconds. After the fluid has cooled, two ounces of pure glycerine,

two ounces of distilled water, and half an ounce of alcohol are added, and the mixture filtered; the clear, deep red fluid resulting will keep for months. But the special point desired, namely, the staining of nuclei alone, is not always easy to secure, this property appearing to depend upon the exact proportion of alkalinity present. This staining process, however, even when not perfectly accomplished, renders the structure of most tumours so much more distinct than it is otherwise apt to appear that it becomes of considerable value to those who have not much leisure to devote to microscopic work. 6th. Glass slides, thin covering slips, and watch glasses.

Pieces of the tumour, the size of filberts, are put to soak in water, to which a pale straw tint has been given by the addition of a little of the chromic acid solution; let this be changed daily for two or three days, when the softest tissue will be hardened, or may be well hardened in the saturated solution of picric acid, as recommended by Ranvier; about forty-eight hours are required. Sections may then be readily made with the freezing microtome—while hardening albuminous tissues it removes calcareous matter; on this account it is useful in the preparation of bone. It does not render the tissues so hard as chromic acid, but at the same time its tendency to produce shrivelling is less. Freezing is a method of very great value; with its aid a piece may be removed from the tumour at once, and the process can be fully carried out in from ten to twenty minutes. The microtome is fully described in the 'Lancet' of July, 1873, and made by Mr Gardner, of Edinburgh. The more we employ the freezing micro-



tome the more clearly we perceive the great assistance which it offers to histologists.

When this hardening is accomplished, very thin slices are taken from one or more of the pieces, the razor being moistened with water; the slices are put into water, and the thinnest, which can be easily discovered, are selected, and either mounted at once or set aside to soak for a few hours in a watch glass containing some drops of staining fluid. With a hooked needle the section is fished up from this fluid, rinsed in pure water, lightly poised over a bit of blotting paper to absorb superfluous water, and laid flat in a drop of glycerine on the slide; it is then carefully covered with the thin glass and is ready for examination. If it is wished to preserve the specimen, the glycerine which may have oozed out from under the covering glass must be carefully wiped off with a damp handkerchief or piece of blotting paper, and Canada balsam, gold size, Bell's cement, or any other ordinary cement lightly varnished round the edges of the cover.

*Mode of keeping preparations.*—The slides should lie on their back, not upon the edge. All preparations should be carefully labelled; the things shown should be mentioned; the date and the name of the mounting fluid ought also to be stated. Never keep a bad preparation, and do not attempt to preserve everything.

In thus advocating the working with sections I am not anxious to underrate the value of scrapings where more elaborate examination cannot be had. There is unquestionably much information to be gained from such stray elements as are to be scraped

up from the freshly-cut surface ; and when one has to give a diagnosis at once, a very shrewd guess can be made by comparing the naked-eye characters of the tumour and its mode of growth with the appearances presented by its juice. The scraping should be made near the margin of the tumour ; if from the centre, little but fatty *débris* will be seen ; if from the extreme edge, smaller, more uniform cell forms, and consequently less characteristic, will be obtained.

## CHAPTER VII

### CLASSIFICATION OF MALIGNANT TUMOURS

#### A. CARCINOMA.

1. Scirrroid, hard and soft.
2. Hæmatoid or fungous hæmatodes.
3. Melanoid or melanosis.
4. Colloid.
5. Myxomatoid or myxoma.

#### B. Sarcoma.

1. Spindle-celled sarcoma.
2. Round-celled sarcoma.
3. Giant-celled sarcoma or myeloid.
4. Mixed-celled sarcoma.
5. Small round-celled sarcoma or glioma.

#### C. Lymphadenoma.

#### D. Epithelioma.

#### E. Psammoma.

There is in most cases no real difficulty in assigning each tumour to its class, but where the characters which should be distinguished are not clearly marked and the origin cannot be ascertained the tumour must be left unclassified.

## A. CARCINOMA

*Scirrroid Carcinoma.*—A carcinoma may be described as a growth originating in proliferation of the epithelium of the gland, having generally an alveolar structure, in which a more or less dense fibroid growth forms a sponge-like or cancerous framework, whose alveoli are filled with loose cells of an epithelial type, from which it grows, grouped together disorderly, bathed in a clear fluid, and having little or no visible intercellular material; the vessels run in the fibrous tissue, not among the cells, and multiplication of cells is by endogenous formation.

When a tumour—a carcinoma, for example—becomes changed at various points into fatty or cheesy substance we regard this substance as the result of fatty or caseous degeneration of the tissues of the tumour. Even when it occurs so largely as to affect the half or more of the substance of the tumour we should hardly think of describing such a tumour as a fatty or caseous growth. It still remains as it always was—a carcinoma, some of the features or even capabilities of which may be affected by the degeneration of its substance, but whose tendencies will still be those of carcinoma. There are offered for examination two main structures in carcinoma, the fibroid framework or stroma and the cells which it encloses.

*Fibroid Stroma.*—About the nature of the fibroid stroma, whether it consists merely of compressed connective-tissue basis of the diseased organ, or whether it is a genuine new growth, various opinions have been held; possibly we may regard the stroma as without doubt for the most part a portion of the new

growth. This stroma differs a good deal in density and in structure in different specimens; and it is in the proportion of the fibrous to the cellular elements that the distinction between "hard" and "soft" carcinoma exists. In its most typical form, as obtained by pencilling out a thin section of scirrhus breast under water, the stroma is seen to have a

FIG. 1.



FIG. 1.—Typical mature carcinoma, from a scirrhus breast—a section hardened by chromic acid solution—showing the alveolar fibrous stroma. The cells have, to some extent, shrunk away from the alveolar walls; the thicker parts of the section show similar bands half out of focus, seeming to show that this fibroid substance forms a cavernous system throughout the tumour. Magnified 220 times.

delicate fibrillated appearance, in which are a few spindle-shaped corpuscles, especially observable at the junction of the alveoli. The thicker parts of such a section show similar bands half out of focus, and a comparison of many such sections seems to show that this fibroid substance forms a cavernous



system throughout the tumour. In other cases the fibrillation is less apparent, and we have then a homogeneous texture like that forming the tough substance of a chronic inflammatory product. More rarely this meshwork is made up of beautiful elongated spindle cells. As to the form of the alveoli, these may vary greatly in shape as in size. In the majority of sections from hardened specimens the spaces will be more or less oval or elongated, and (probably as the result of the action of the hardening reagent) the cells will often retreat slightly from the walls of the alveoli (Fig 1), rendering the outline of these more clearly discernible. Injections have shown this stroma to be abundantly supplied with vessels, and, as might be *à priori* supposed, the delicate vessels in "soft" carcinoma, as in other soft new growths, lacking the support afforded by the denser fibrous tissues of the firmer varieties, are prone to aneurismal dilatations, and the frequent rupture of these weakened vessels give rise to the many varieties of colour and consistence which characterise such tumours. Bearing this condition in mind it is easy to understand the abundant milky juice which exudes from a freshly-cut scirrhus, as also the large number of cells which float out into the surrounding glycerine when a thin slice of fresh carcinoma is mounted for examination; and the scanty cohesion between these cells further explains their fatal tendency to transplantation to distant organs, being easily hurried away in the lymph or blood stream which may reach them. One must bear in mind the relation the minute lymphatics hold to the alveoli, and the important bearing this point has upon the question of extension or dissemi-

nation of the disease. The stroma is also often the seat of an abundant infiltration of the same small spherical cells which by their grouping give rise to the first appearance of carcinoma.

### THE CELLS

The microscopic cell of a scirrroid carcinoma seems to be in its younger stage a spherical mass of protoplasm, containing a comparatively large oval nucleus with bright nucleolus, much resembling the cells of the rete mucosum or lower layers of the cuticle; but, like these, as development proceeds, the spherical cells, closely squeezed together and increasing in volume, undergo many variations in size and shape, according to their rapidity of multi-

FIG. 2.

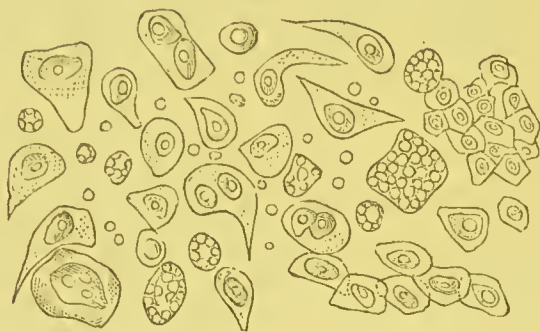


FIG. 2.—From a scraping of a freshly-cut scirrroid carcinoma of the breast. Magnified 220 times.

plication and the extent and direction of peripheral pressure.

The cells of scirrroid carcinoma are more remarkable for their multiformity of contour and size than for any special peculiarity distinguishing the indi-

vidual cells. Perhaps the most constant shape is a slightly compressed oval, five or six times as large as a white blood-corpuscle, with a single large oval nucleus and a bright nucleolus; but in the later stages the cell becomes larger, and, in consequence, more irregular in outline (Fig. 2). In the earlier stages of the disease it is common to find cells small and of a tolerably uniform oval shape, but arranged in the same way in the meshes of a fibrous stroma (Fig. 4). A special attribute of all these cells is a proneness to speedy decay. Hence, it is difficult to make a scraping from a divided scirrhus breast which shall not contain many cells more granular than they should be, and some few whose nuclei are obscured by the little bright oily particles which in others so fill the cells as to render its parts wholly undistinguishable.

In the softer growths (Fig. 3) it is sometimes difficult to make out any fibrous stroma at all without careful pencilling, so delicate are the bands and so wide the meshes.

In well-marked scirrhus, on the other hand (Fig. 1), the alveolar arrangement is particularly conspicuous. Again, in some parts of such a tumour, field after field of the microscope will exhibit only a flat surface of fibrous texture in varying stages of development, and then, perhaps, a few irregular groups of cells will herald the approach of a confused mass of richly cellular structure, which may again as suddenly give place to considerable tracts of connective tissue or remains of mammary gland, if it be a scirrhus of the breast which is under observation. Moreover, if the section be taken from the extreme margin of the scirrhus nodule, a

distribution through the fibrous tissue of small spherical corpuscles, very like leucocytes or wandering white blood-corpuscles, at first in twos and threes, but soon in larger clusters, until these seem to change into the groups of larger oval nucleated

FIG. 3.

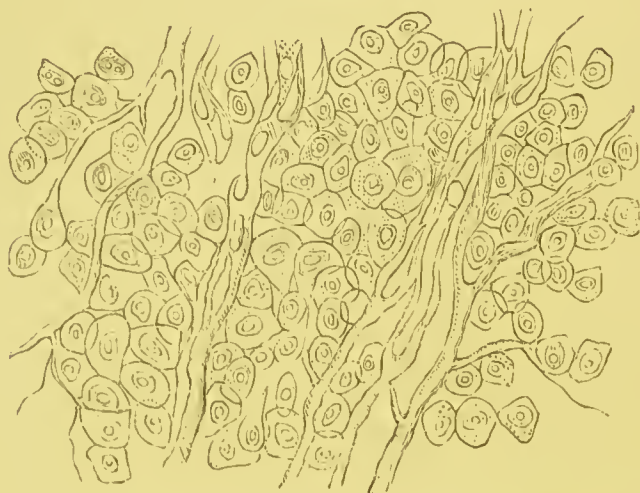


FIG. 3.—A thin section of a very soft e carcinoma of the breast after hardening and staining. The cells, in their size, shape, and arrangement, cannot be distinguished from those of a scirrhus of the breast; but the fibroid stroma, which, in the latter case, occupies so prominent a position, is here barely distinguishable, slender homogeneous fibrils interlacing to form wide and deep loculi, in which the cells are packed. Magnified 220 times.

cells, which are not very different from those of mature carcinoma (Fig. 4).

As stated above, “seem to change,” for it is very difficult to trace accurately these tissue transformations, and many eminent observers ascribe the origin of the cells of scirrhus to the glandular epithelium, whilst others are equally confident of their development from proliferating connective-



tissue elements. It must be remembered, also, that recent observations upon the nature of leucocytes or wandering white blood-corpuscles render it possible that these furnish the starting-points for the cells of carcinoma as for those of many other new growths (Professor Cohnheim).

FIG. 4.

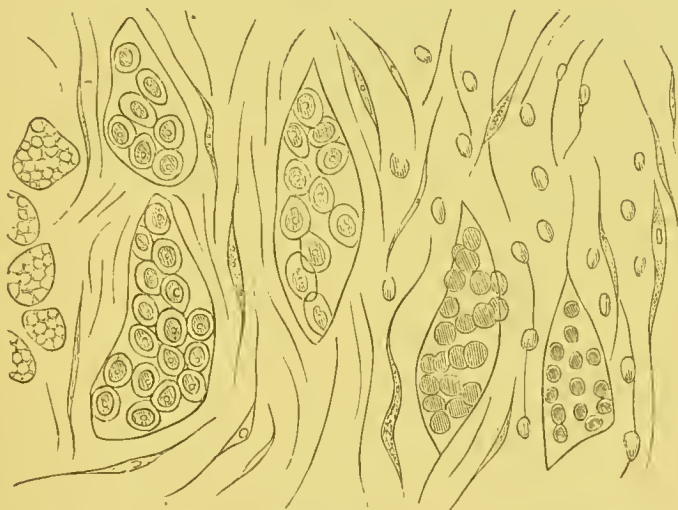


FIG. 4.—Developing carcinoma from the extreme margin of a scirrhus nodule. The fibrous tissue to the right of the sketch is seen to be dotted with minute granular corpuscles (the “indifferent granulation material” of Virchow), which are also collected in groups. To the left are the young, oval, nucleated cells of the tumour, arranged in elongated alveoli—some fatty cells. Magnified 220 times.

This form of malignant disease is specially typified in ordinary scirrhus of the breast, but the appearances of carcinoma as it affects other tissues, as bone or muscle, undergo certain modifications.

The secondary growths met with in the liver or lungs are, as a rule, more richly cellular than the primary tumour; but, excepting that the stroma is less obvious, there is very little other difference



discernible either in the form or size of the cells or in their arrangement; sometimes, when the development of these secondary tumours is exceedingly rapid, an unusual preponderance of the small cells before described may be met with. In the outlying pea-like nodules, which occasionally occur in the pectoral muscles beneath a scirrhus breast, and which afford such beautiful opportunities for the study of the infiltrating characters of carcinoma, it often happens that the bulk of the tiny mass is made up of these small indifferent cells, with merely a trace of the alveolar fibrous stroma so characteristic in mature carcinoma.

Carcinoma affects bone either in the form of distinct tumours or as an infiltration of the bone with cancer elements, so as to affect its consistence rather than the shape of the bone, occurring as either primary or secondary growths. In such cases there is an abundant milky juice to be scraped from the section of the softened bone, and in this juice are just such cell forms as are commonly met with in the juice of a scirrhus tumour (Fig. 5).

Very thin sections of bone so diseased show groups of such cells enclosed in spaces corresponding to the Haversian spaces of the original bone; but, besides this, the osseous lamellæ are occasionally found to be divested of calcareous matter, and to form a fibrous stroma very like that of ordinary carcinoma, the lacunæ being swollen into groups of new cells in some parts, as though these cells resulted from the proliferation of the original lacunal cell. In other cases of primary carcinoma of bone a structure precisely resembling ordinary scirrhus is met with, the fibrous stroma being

replaced more or less largely by interlacing spicules of new bone.

Scirrhus prevails in the majority of cases and has its preference for the breast, the uterus, the stomach, and the rectum ; this, therefore, is the form of cancer

FIG. 5.



FIG. 5.—A thin section from a scirrhus carcinoma of bone. The section shows the fibroid stroma with elongated meshes, the cells of an epithelial type, and the absence of intercellular material, which are characteristic of carcinoma. At one point the stroma has given way, and some of the cells have escaped. The irregular shape of the cells, with the uniform large oval nuclei and bright nucleoli, are well seen ; but in addition the section shows a spicule of bone, probably of new formation, containing lacunal cells with rudimentary canaliculi. Magnified 220 diameters.

which comes most frequently under the notice of the surgeon.

Scirrhus may be developed either in the form of a tumour or it may be infiltrated in the substance of organs. In its earlier stage of growth it appears as

a distinct and very hard tumour, often movable, free from pain, in size not larger than a hazel nut. For a considerable time it may escape detection, some accidental circumstance directing the patient's attention to a condition that had really existed long before.

### SOFT CARCINOMA

Soft carcinoma, known by the terms encephaloid, medullary, or acute cancer, is very closely allied to the scirrroid carcinoma or hard variety, from which it differs merely in the greater rapidity of its growth, and the consequent small amount of its stroma and the softness of its consistence. Soft carcinoma and scirrroid carcinoma cannot be regarded as in any way constituting distinct forms of cancer. There are all intermediate stages between them, and the differences in the rapidity of their growth, and consequently in their structure and physical characters, constitute their only distinctive features. The epithelial growth in soft carcinoma is rapid and abundant, and the cells, for the most part, larger than in scirrhus, quickly undergoing fatty degeneration, so that often more free nuclei than cells are visible. The proportion of stroma is very small, and owing to the rapidity of its growth it is much less fibrous than that of scirrhus, and does not undergo a similar cicatricial contraction. The blood-vessels are often very abundant, and the tissue supporting them being soft and non-resistant hæmorrhage occasionally takes place (Fig. 3).

Soft carcinoma is of a soft brain-like consistence, the central portions, where fatty degeneration is

most advanced, often being completely diffiuent. The tumour is sometimes more or less lobulated. On section, it presents a white pulpy mass, much resembling brain-substance (hence known by the name encephaloid), which is often irregularly stained with extravasated blood.

Soft carcinoma is much less common than scirrroid (hard) carcinoma. It is most frequently met with in internal organs as a secondary growth. It also sometimes occurs primarily in the mamma.

Secondary growths to which scirrhus gives rise are often soft carcinoma.

Many growths formerly described as encephaloid or medullary cancer are soft sarcomata.

Before leaving this part of my subject there is a class of growth of the breast which often puzzles the most experienced, and frequently requires repeated examination to arrive at a correct diagnosis. At some indefinite period subsequent to a blow on the breast, varying from three weeks to so many months, the patient will discover a hard lump to which her attention has been directed by the occurrence of some severe pains. Upon examination it will be found that there is a defined tumour in the substance of the breast, which is quite hard, sensitive to pressure, situated just beneath the nipple, and in rare instances attached to it, but not conveying the sensation of that heavy leaden weight which is characteristic of scirrhus. I allude to adenoma or glandular tumour.



## CHAPTER VIII

### SCIRRHOID CARCINOMA OF THE BREAST

It is generally situated either in the centre or at the edge of the mammary gland. At first it is somewhat rounded, it afterwards becomes irregular in shape, and as it merges into the general structure of the parts it is found occupying a considerable portion and not unfrequently the whole breast. As the tumour grows the adjacent tissues become affected; it has reached the skin, which becomes adherent, and after a time discoloured, and there is gradual contraction and absorption of surrounding parts.

In size scirrhus tumours are not large; their formation and existence for many months, and sometimes for years, is unattended by pain. When it does occur early it is generally of a smarting, lancinating, or burning character. The patient's health does not always suffer. After a time the local tumour shows signs of becoming more diffused; one of the very first of these is observed in the infiltration of the adjacent lymphatic glands. The axillary glands enlarge first, and they are followed by those placed beneath the lower pectoral and by those situated above the clavicle. Very frequently the pressure exercised by these hardened and enlarged glands on the subclavicular and axillary veins causes œdema of the upper extremity. This takes place at periods varying from a few months to a



year or so. It may happen that emaciation is entirely absent. The general tendency of scirrhus tumours being to contract the part they invade, the very constant and early adhesion of the skin to the growth can therefore be readily understood. In some instances this contraction takes place to such an extent as to leave no traces either of the tumour or of the mammary gland. This form of disease has been described by some authors under the name of atrophic scirrhus. As an early result of this in-drawing tendency of scirrhus carcinoma the nipple is very frequently retracted. The elastic expansion of the skin so characteristic of the sarcomatous formations in this gland is impossible. It soon changes colour, assuming a violet hue, and at last gives way by a kind of erosion, and finally ulcerates.

The nipple is retracted under the same cause as the skin; this arises mostly in the slow growing tumours, but in the quick, or soft, or rapid growing tumours this puckering-in of the skin and nipple is the exception, and arises from their being less hard, larger, and with the skin covering them more expanded. Taken by itself retraction of the nipple is unimportant, as it may arise from other mammary inflammations, but when regarded in connection with the other symptoms, it constitutes a most important circumstance in determining the exact nature of the disease.

The period at which ulceration takes place varies greatly in different cases; most commonly it occurs between six months and two years, assuming two distinct forms—the superficial and the deep.

The superficial is an erosion of irregular shape, without raised edges, on the surface of the breast.

The deep penetrates within, removing in its progress the gland, muscles, and bones. Its edges are raised, hardened, with an irregular margin. The floor is of a greenish-yellow colour, sometimes clean looking, and pours forth an abundant matter possessing a very peculiar characteristic odour. It may extend to the axillary and supra-clavicular regions; attacks of hæmorrhage frequently occur. This form of ulceration extends over a considerable period without making much progress, the patient dying from hæmorrhage, or the affection of some internal organ, or from a gradual decline of the vital powers, arising more or less from the secondary deposits in the pleura, lungs, or other organs.

Scirrhus occasionally and rarely occurs in both breasts; where operation has been recommended the two breasts have been amputated at the one time.

The male breast is occasionally attacked by scirrhus.

Scirrhus, on section, cuts crisply, like potato or cartilage, and when the section is made of a scirrhous tumour while in a stage of induration the presence of a containing and contained part is immediately recognised. The incised surface has a glossy, semitransparent aspect; it is of a greyish-or bluish-white colour.

Scirrhus is very liable to undergo fatty degeneration, so that a cut surface will generally be found marked with yellowish streaks or patches. Another point to observe on the freshly-cut surface is that it invariably assumes a concave appearance; this is owing to the contraction of its fibrous stroma.

The containing tissue or stroma is formed of

bands of fibrous appearance, which are readily distinguishable by their being more opaque and less glossy, and their mode of arrangement varies considerably. This stroma differs a good deal in density and in structure in different specimens, and it is in the proportion of the fibrous to the cellular elements that the distinction between "hard" and

FIG. 6.

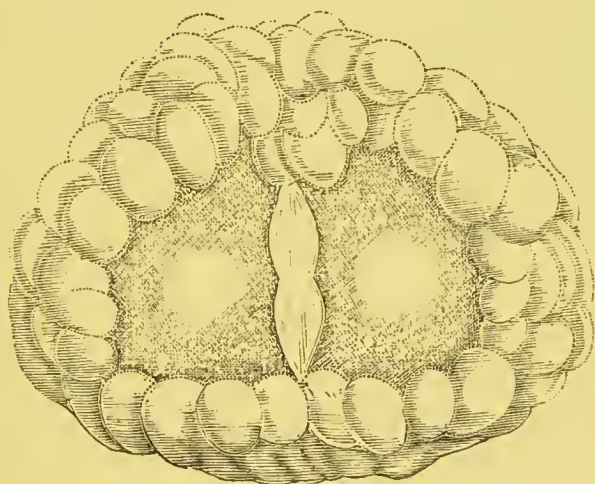


FIG. 6.—Section of a hard scirrhus tumour of the breast, laid open from behind. Reduced in size.

"soft" carcinoma exists. These bands in some instances form spheroidal cells, in others they are deposited in right lines, in others they radiate from a central fibro-cartilaginous nucleus to the circumference of the tumour, and stretching beyond the tumour itself into the surrounding cellular tissue.

Hardness is the principal characteristic of this species of "hard" carcinoma, and this induration is generally pretty equal throughout. Sometimes there are scattered through the substance of the tumour one or more small masses of homogeneous pulpy

matter, of a yellow-brown colour, semitransparent and glutinous.

The induration very quickly and almost suddenly softens; the layer of hard matter nearest the softened pulpy stratum possesses as much hardness as exists in the other parts of the tumour.

By using considerable pressure to the section of a scirrhus tumour, the thin albuminous clear fluid may be forced out; this has been termed the scirrhus ichor or juice. The enclosed matter adheres rather firmly to the fibrous septa. The microscopic characters have already been shown.

Scirrhus "en cuirasse." This is so-called because it infests the whole skin of the chest, which it converts into a hard and rigid mass, inflexible as a breast-plate. It begins in the form of small nodules, like shirt buttons, in the skin. It may either be primary or secondary; generally, however, it occurs after extirpation of the breast. It does not seem to infest internal organs as a rule. In consequence, however, of its tendency to spread, and of the nodules to become confluent, the breathing becomes much interfered with, and death may result from this cause.

Cancer of the breast is, according to Lebert, of the hard scirrhus variety in three fifths of the number of cases; of the soft variety in one fifth; and of the intermediate forms, including a few rare and exceptional cases of melanotic and colloid cancer, in the other fifth. Paget believes that of every 100 primary hard cancers, 95 would be found in the breast, and estimates the number of soft cancers in this part much lower than Lebert.

The average age at which this disease begins is



from thirty-five to fifty-five. Of 62 cases adduced by Lebert, 158 by Paget, and 147 by Birkett, only 22 appeared before the age of thirty.

The younger and more robust the patient, and the more rapid the early symptoms, the worse will the prognosis be. On the contrary, scirrroid carcinoma affecting the aged and atrophied may linger on for ten, fifteen, or twenty years.

The average duration of life is less than four years, but in this matter there is great diversity. In some cases the disease begins furiously and kills in a few months. In these the skin is usually affected at an early period, becoming brawny and thickened, or infiltrated with scirrroid nodules. In some of the more rapid cases the disease finds its way into the thorax by infecting the lymphatics which accompany the internal mammary vessels, producing early and finally distressing dyspnœa. In the slower cases it makes progress by infecting the axillary lymphatics along the external mammary vessels, and produces pain and swelling of the whole arm by pressure upon the axillary vessels and plexus.

The first question that will arise is as to the propriety of extirpation. It may be laid down, as before stated, that although it were proved that the operation does not prolong life in the end—although the disease may be sure to return in the cicatrix or elsewhere—yet that the surgeon should advise it as a means of procuring temporary (sometimes for years) relief from the pain, discharge, weariness, and anxiety of disease; provided, first, that the internal organs are sound and the health such that the operation itself is not likely to be dangerous; and, secondly, that the breast is yet not so adherent, nor



the skin and glands so infiltrated, as to render it unlikely that the wound will cicatrise.

An exceedingly rapid progress, especially of soft cancer in young persons, may render an operation hopeless, whilst an exceedingly slow atrophic process in the old would render it unnecessary.

In attempting to explain the frequent cause of immediate recurrence of the tumour by particles of the morbid growth being left behind by the operator, it is not intended to deny that cases may, and undoubtedly do, arise from time to time in which, after an absolutely complete removal, a similar growth may spring up in or near the cicatrix after a lapse of many years, from the same causes which led to the formation of the primary growth.

The secondary growths spreading from a scirrroid carcinoma of the breast along the lymphatic glands to the axilla are hardly ever so hard as the original tumour, and they may present very various degrees of softness without losing their distinct anatomical structure.

Again, certain cases occasionally present themselves in which the lymphatic glands, swollen and indurated, yet gradually subside after the removal of the tumour which apparently infected them, and these are sometimes said to be instances of cancer of the glands, disappearing upon the removal of the primary cancer. From what we know of the nature and habit of cancer, however, it is not probable that this ever takes place. It is more likely that these are glands in a state of fibroid induration due to prolonged irritation—a condition frequently met with apart from any malignant disease, and due to a certain pathological process, in which

the delicate fibrillar network which normally supports the corpuscular elements of the gland becomes enormously thickened and increased, gradually pressing aside the corpuscles, and materially affecting the function of the gland.

The diagnosis of such enlarged and indurated glands, from glands the seat of carcinomatous growth, may be and is often very difficult. The main points to be relied upon are the absence of tenderness and the fixation to surrounding parts, especially the skin, causing the dimpling and brawny hardness usually present in the more advanced stages of carcinomatous infiltration.

It should be mentioned that the secondary growths are always essentially of the same nature as the primary when affecting the lymphatic glands, but it must be borne in mind that this does not exclude instances of medullary or "soft" carcinoma appearing in the axilla secondary to a scirrhus nodule in the breast.

## CHAPTER IX

### ON GLANDULAR TUMOUR, OR ADENOMA OF THE BREAST

ADENOMA is the term by which all glandular tumours are now designated, whether they be found “in the secreting glands, the lymphatic glands, or those organs which, because they have no open ducts, we name the ductless glands.” The chronic mammary tumour of Sir Astley Cooper—fibrous tumour of Cruveilhier—sero-cystic sarcoma of Brodie, are synonymous expressions for adenoma of the breast. Such tumours consist of glandular structure, which is identical with the healthy type, and which may be considered as a hypertrophy of normal tissue. They have this important difference from normal gland tissue, they have no excretory ducts, and partly their tendency is to become cystic.

These tumours, for the most part, grow very slowly and are not painful; they are firm and elastic, feeling in the early stage like the natural gland structure of the breast, exaggerated; afterwards like petty cysts tensely filled with fluid. They are freely movable and the adjacent skin is unaltered. The nipple remains unaffected. The tumours are generally encapsuled, and the capsules formed by the condensation of the connective tissue around a rapidly growing acinus partly form cysts and contain the serum, whence the name sero-cystic.

Portions of the tumour are often found softened and in a state of cheesy decay. The growth is usually slow, and the size attained may be enormous, when removed weighing near thirty pounds. No age is exempt, yet the majority of cases occur in young women under thirty-five, mostly about the age of puberty. Nevertheless they may occur in middle-aged women and then grow more rapidly, and there is a greater tendency to cystic degeneration.

The tumour generally commences at the circumference of the breast; and is produced by the hypertrophy of one lobule. It is movable under the skin; feels granulated just as the natural organ does when its tissue is developed by lactation or during menstruation. The growth may increase so as to cover over or cause atrophy of the remainder of the organ, yet it is not attended with retraction of the nipple, or adhesions, or enlargement of the lymphatic glands. There may be pain, especially at the menstrual period, when the entire gland becomes enlarged and tender, yet it is not the pain of cancer. When cysts are formed they may be felt, tensely filled and fluctuating; the growth increases slowly or quickly; at last it distends the skin, and a round aperture is formed by ulceration, from which a cauliflower excrescence sprouts out, and the pain and discharge has then a serious effect on the health.

This tumour may last almost any number of years, and may increase to a great size without greatly affecting the general health. In some cases it disappears of itself; in others it remains stationary.

On cutting through these tumours the following

structures are usually found. A development of more or less perfect gland-tissue. Hypertrophy of the fibrous tissue, which envelopes and intersects the gland, with the abundant formation of spindle-shaped cell exudation, more or less developed into tissue, firm or gelatinous. In the meshes of this interstitial tissue cysts, filled with a serous fluid, coffee-ground matter, or other kind of altered lacteal secretion, are liable to form, or they may be formed by the dilatation of ducts with no outlet and lined with epithelium.



## CHAPTER X

### ON SCIRRHOID CARCINOMA OF THE UTERUS

IN describing the symptoms of cancer, or scirrroid carcinoma of the uterus, it will be easier to take them under its different stages.

1. Primary or incipient stage.—The patient may experience only comparatively slight and transient attacks of pain, or perhaps only sensations of uneasiness referred to one or the other iliac fossa, or in the situation of either ovary, there may be decided fulness or a distinct tumour tender to the touch, or pain may be referred to the os uteri, accompanied with tingling sensations along the front and inside of the thighs, lasting for a few hours or days, and then disappearing, absenting itself for weeks, and then returning. Occasionally, sexual intercourse is attended with pain, and followed by a slight show of blood. Generally there is some slight irritability of the bladder, and frequently the irritation about the rectum and anus is of such a nature as to cause the patient to suspect she has hæmorrhoids. The catamenia are generally regular in their appearance, although occasionally their order is disturbed, or they may be mixed with blood. Leucorrhœa is by no means constant in the intervals. The appetite remains good, digestion is well performed, and the patient makes no complaint of want of sleep until

the disease has lasted for some time. The pulse at first is generally regular and of full volume; and it is not until the disease has existed for a considerable time that the appetite becomes impaired, the sleep disturbed, the flesh becomes flabby and wastes, and the countenance becomes pallid and indicative of serious organic mischief.

If an examination be made *per vaginam* the edge of the *os uteri* is found hard, sometimes fissured, and of irregular form, projecting more than usual into the vagina. Several small, hard, and defined projections are felt in the situation of the muciparous glands, giving the finger the feeling of grains of shot or gravel under the mucous membrane. If pressure be made firmly upon these the patient will complain of pain and sickness. The *cervix uteri* is frequently enlarged and indurated. The *os uteri* is turgid; and if a speculum be employed, it will be seen to be of a deep crimson colour, but the projecting shot-like points have a bluish hue. There is scarcely any thickening or other alteration of structure in any part of the vagina, the uterus is generally movable, and the disease appears to be confined to the *os uteri* and lower part of the *cervix*.

This stage of the disease is in many instances very slow, lasting sometimes for years, until these granular bodies acquire greater volume by the further increase of the morbid action, when they give to the part the unequal, bumpy, and knobbed condition.

2. The secondary stage.—In this stage the symptoms arising from increase of the weight of the uterus are very distressing. The uterus descends to below its natural level in the pelvis; there is uneasi-

ness in standing or walking, weight upon the perineum, sometimes a feeling of irritation upon lying upon one of the sides; there is distress in passing the motions, and frequent desire to pass the urine, with an increase of mucous discharge from the bladder. The pains are greater than in the first stage, and are more lancinating. The discharge from the lining membrane of the uterus is increased, but it is of a bland character, and has none of the fetid and acrid qualities which are seen in the third stage of the disease, or where ulceration has taken place. Blood is occasionally mixed with the discharges, but it is more usually seen mixed with the catamenial secretion. Occasionally the patient has œdema of the lower extremities.

Examination per vaginam will detect the cervix and body of the organ to be tumefied and hard, and the margin of the os uteri to be notched in two or three places without breach of surface. The mouth of the womb is rather more open, the lips are rigid and firm pressure causes pain. The uterus is not so movable as in the first stage, but it is seldom fixed in the pelvis until the commencement of the third stage. Just previous to ulceration taking place, if careful examination be made, we shall find that some part of the tumid and indurated viscus is softer than the rest; at this spot ulceration will occur, and considerable pain will be caused when on examining the finger makes pressure. Using the speculum, the cervix appears to be swollen, tense, and shining, sometimes spongy, of a deepish or brownish colour.

This stage of the disease lasts a longer or shorter time, depending upon the strength of the patient's

constitution, and the nature and amount of the remedies employed. These too often impair the general health and destroy the appetite, the patient becomes dyspeptic and suffers from cardialgia, and not unfrequently urticaria occurs as a very troublesome symptom.

3. The third stage.—This is marked by an increase in the pains, which are of a very lancinating nature; sometimes they are described as burning, in other cases as gnawing; in a few cases little or no pain is complained of. When pain is present, it is generally more aggravated during the night, probably increased by the warmth of the bed; the course of the pains is through the womb to the pubes and loins down to the anus and thighs.

Sometimes the pains occur in paroxysms, once, twice, or thrice during the day, and lasting for some hours; they may take the course of either the sciatic or crural nerve. Sometimes they fix upon a distant part, as the foot, and never attack the pelvis. The discharge of blood which might have been occasionally mixed with the leucorrhœal discharge or with the catamenia is the first indication of ulceration; in fact, it generally precedes the increase of pain, and is the first circumstance that causes alarm in the mind of the patient. Some women have been known to regard this hæmorrhage as a favorable symptom, and have looked upon it merely as a change in the constitution, viewing it as a return of the menstrual secretion. The amount of blood lost is occasionally very large, especially at the earlier stage of ulceration, which appears to be in some degree checked by the occurrence of the discharge, the returns of which are more frequent at



the commencement than towards the close of the ulceration. Before ulceration commences the discharge between the menstrual periods has been little more than leucorrhœa, but as soon as this organic change takes place, its odour becomes fetid, its colour becomes dark brown, dirty white, green, or black, usually tinged from a slight admixture of blood, and it is then secreted very copiously, occasionally containing flocculi of lymph or coagula; its acidity frequently causes the inner surface of the labia to be very tender, and the orifices of the vagina and anus are frequently excoriated, which excoriation in many cases extends down the thighs. As the dysuria becomes developed or increases, there is an admixture of mucus with the urine; the urethra and meatus urinarius become thickened, which still further increases the irritation, in some cases amounting to retention of urine. As the disease advances, the ulceration may extend to the bladder or rectum; the latter is more frequently attacked than the former, owing to its proximity and to there being but a small quantity of cellular web between the parts. Previous to ulceration of the bowels taking place the patient will have great difficulty and pain in going to stool; this is partly owing to the forcing of the abdominal viscera down upon the diseased mass in the pelvis and partly to the pressure of the fæces themselves in their passage through the rectum.

The patient's pulse is quick, small, and wiry, there are febrile attacks, accompanied with nocturnal perspirations, diarrhœa, and night-watching. The skin is yellow, parchment-like, and shrivelled; sometimes during the day it is hot and dry.



The patient becomes greatly emaciated, the muscles waste, the eyes become sunken, the countenance has a sharp distressed expression, the features are drawn upwards and become very prominent. The appetite is either greatly diminished or ceases altogether, digestion is greatly impaired, there is nausea, frequently vomiting, sometimes intense thirst, diarrhœa not unfrequently alternates with constipation, the tongue becomes glossy, and dry, occasionally it is sore; sometimes there are patches of aphthæ in the mouth, as well as in the vestibulum and around the anus. Occasionally patients die with the symptoms of quiet stupor.

Examination per vaginam enables us to detect a hard, irregular, immovable mass, filling the pelvis, and about its centre the os uteri, which is more open than natural, its edges being thickened and ulcerated; the ulceration may extend completely round the cervix, or the anterior or posterior half alone may be affected and extend ultimately to the bladder or rectum; the ulceration is generally tender upon pressure, and the finger when withdrawn is covered with fetid sanies, frequently tinged with blood. Sometimes a fungoid growth projects from the os; this is rough, unequal, and tender, and it is found that the tumour springs from an ulcerated surface, and will in its turn also become the subject of ulceration. In some cases the disease extends to the vagina, and then the inguinal glands become enlarged. The canal becomes rough and unequal. In cases where there is a fistulous communication with the bladder a large quantity of earthy matter is deposited upon the rugæ of the vaginal mucous membrane. If the speculum be employed, which

the great pain caused by the introduction of the instrument in many cases interdicts, the ulcerated surface will be found of a greyish colour, occasionally dark brown, the edges being irregular and unequal.

If the disease has passed beyond the first stage, the prospects of the patient are decidedly of the most unfavorable kind. If it be known to be in the first stage, I endorse what Dr Montgomery says, "that something may be done to stem, at its source, the torrent of agonies that will otherwise overwhelm the patient, nay, I firmly believe it may in many instances be altogether turned aside and the victim rescued from the sad fate impending over her." But if the disease has progressed to the second stage there [is little, if any, hope of cure. The length of the disease will, in all cases, depend upon the strength of the patient's constitution, the amount of the losses of blood, the extent of the discharges, but at length the patient will either die of exhaustion, of peritonitis, enteritis, or cerebral effusion.

The average duration of the disease is twenty months, the shortest three months, and the longest seventy months. In single women, as also in married women who have borne no children, the average duration of life is the same, namely, about twenty-two months.

What, then, can be done? Our endeavours should be chiefly directed to maintain the patient's constitutional powers, and to put off, as far as possible, the occurrence of ulceration. All circumstances that have a tendency to depress the strength or harass the mind must be avoided; everything that has a stimulating tendency, as equestrian exercise, dancing, party or ball going, and especially sexual

intercourse, must be avoided. The diet should consist of the lightest and most easily digested articles of food; wine should be of the mildest nature, and sparingly taken.

If there be rigidity of the os and cervix, blood may occasionally be extracted by cupping, or by leeches to the vagina; but, at the same time, due and efficient care must be paid that the quantity of blood lost is not so great as to injure the patient. Counter-irritation may be tried by the application of a blister to the loins or thigh. The bowels must be kept free, and for laxatives the best are the saline purgatives, because they cause fluid stools. Hip baths may occasionally be of service. The patient should be warmly clothed to keep up the capillary circulation. Vaginal injections containing lead certainly do good, and the exhibition internally of iron and some form of iodine is of great advantage.

To sum up, then, the treatment in the second stage of the disease is—1st. To lessen congestion by local depletion. 2ndly. To relieve, as much as possible, the mechanical pressure by position, attention to bowels, &c. 3rdly. Supporting the constitutional strength, and relieving suffering by the combination of anodynes and tonics, endeavouring to promote the absorption and removal of the organic deposit by the exhibition of iron and iodine.

When ulceration once occurs its progress will be found also to vary in different cases, rendering the treatment not only more difficult but less effective. The discharges that take place so greatly depress the patient's constitutional powers that blood-

letting, or any other means of depletion, will do harm. In some cases other symptoms arise, as those of inflammation of the peritoneum, which call for some special treatment; but in such cases the mildest measures must be resorted to, for if the treatment be too heroic our patient's powers will soon be exhausted.

For the purpose of alleviating the patient's sufferings, narcotics are decidedly of the greatest utility; they may be given internally, or they may be administered externally in the form of hypodermic injection or suppository. There are two disadvantages that result from the employment of narcotics: one is constipation, and the second is loss of appetite. The second object, that of maintaining the patient's strength, will be best accomplished, not only by giving her the greatest quantity of nutritious food in the smallest possible compass, but also in using our best endeavours to lessen the amount of the discharges, and to alleviate the distressing sickness which not unfrequently increases the patient's sufferings. The fetid smell of the discharges may also be corrected by the employment of diluted solutions of the chlorides of soda and lime, carbolic acid, permanganate of potash, sanitas, terebine, &c.

If the hæmorrhage be excessive, we must arrest it by the application of cold to the external parts, or lumps of ice inserted into the vagina, and the administrations of astringents by the mouth, at the same time enjoining the patient to take absolute rest. If this be ineffectual, the plug or tampon must be employed, but the greatest tenderness and caution should be used in its application. Inde-



pendent of their soothing or astringent effects, the employment of injections is beneficial for the sake of cleanliness, in removing the discharges, and preventing the excoriation. The distressing sickness which so frequently accompanies the latter stage of this disease must be treated by applying spongio-piline, soaked with chloroform, over the region of the epigastrium. The attention of the surgeon should be directed to the daily evacuation of the urine, as in some cases it is apt to accumulate and give rise to stupor, which gradually merges into coma, insensibility, and death.

It will be seen that the remedies and method of treatment here recommended are mostly palliative, and not fitted or designed to remove the disease, but to accomplish this object, two operations have been recommended and put into practice: one, the removal of the whole of the diseased uterus, and the other, the excision of the os uteri, the latter being employed in those cases only where the disease is confined to the os and anterior part of the cervix uteri.

From what I have seen there are not many cases fitted for the performance of either operation, especially the latter, for unless there is a line of healthy tissue between the diseased portions to be removed and the body of the uterus, the disease will most certainly return in a short space of time. The truth is that we are seldom called upon to examine a female until the disease has advanced beyond its early stage and made some considerable progress. Besides, in my opinion, it is useless to remove the diseased portion, however favorable the case may be, unless we can remedy the cancerous



diathesis which exists in these patients, and which leads to the redevelopment of the disease in the uterus or in some other distant organ.

If, however, excision of the os uteri is to be performed, great care should be taken in selecting the cases; and we should assure ourselves that the whole of the disease may be removed, that is, when it is confined to that portion of the uterus below the insertion of the vagina into the superior part of the cervix uteri; and that the lymphatic glands and surrounding cellular membrane are unaffected, which would be known by the mobility of the uterus; and where there is not any serious deterioration of the general health.

Whichever method of operating we have recourse to, great attention must be paid to restrain the hæmorrhage, as many patients have lost their lives from this accident. This may be prevented by plugging the vagina with lint or tow, due care being taken to ascertain that the bladder is emptied, as patients can seldom pass their urine without the assistance of the catheter when the plug has been employed. Besides the danger of immediate hæmorrhage, there is the risk of secondary bleeding. Hysteritis or peritonitis may occur, and rapidly prove fatal; this has been found to take place more frequently in those cases where the vagina has been wounded than in those where it has been left intact. If any of the morbid structure be left the wound will not heal, the edges will ulcerate, and, disease spreading, the patient's constitutional powers will become rapidly exhausted.

It is rather remarkable that so serious and malignant a disease should not prevent the possi-

bility of conception. Cases are recorded in which pregnancy occurred when the uterus was affected with carcinoma in its several stages.

If the scirrhus formation be in its early stage, if it be small in size, and if the patient's constitutional powers have not been too much lowered, the woman will generally go through her labour, although such process may be lingering by the presence of such a tumour; and, even when the child has been delivered with instruments, the patient will, for the most part, recover the immediate shock of parturition to die, at an earlier or later period, from the effects of the malignant disease. But it must be allowed that all labours, whether terminated naturally or artificially, cause the progress of the disease to be more rapid. Abortion not unfrequently takes place when there is malignant disease of the uterus. The prognosis with respect to the life of the child is generally unfavorable. In cases where there is so much structural change that the application of the forceps is impracticable, and where the child is alive, it is of great importance to determine whether we are not justified in recommending delivery by the Cæsarean section.

## CHAPTER XI

### CARCINOMA OF THE STOMACH

CANCER originates in the stomach more frequently than in any other organ, with the simple exceptions of the breast and uterus.

The stomach now and then becomes involved in cancerous disease commencing in the subjacent cluster of lymphatic glands, but, almost always, cancer of the stomach is primary.

All the principal varieties of carcinoma, scirrroid, soft or medullary, or colloid, occur, separately and in combination, in this organ; the colloid, though much less common than the other varieties, is more frequent in the stomach than anywhere else.

The different parts of the stomach are not equally liable to cancer. The pyloric end is by far the most frequent seat of it; next, perhaps, the cardiac orifice; then, the space along the smaller curvature between the two orifices. The part least liable is the big or splenic end.

Sometimes the cancer, at the time of death, is of small extent, but occasionally, and especially in colloid carcinoma, the disease spreads until the greater portion, or even the whole, of the stomach is involved.

When cancer originates at the pyloric ring, it

spreads towards the big end of the stomach, but not in the opposite direction along the duodenum.

The changes which the stomach undergoes, and the course of the disease, vary with the kind of cancer.

Scirrroid, which is the most common variety, appears first as a thickening and induration of the submucous cellular tissue, difficult to be distinguished from the thickening and induration caused by the contraction of effused lymph, except by the circumstance that it is less uniform and that the mucous and muscular coats soon become adherent to the hard tissue between them. From the part first affected the disease spreads into the cellular tissue beyond, and gradually involves the muscular coat on one side, and the mucous on the other.

The muscular layer becomes affected early, and in an even uniform manner. The cancerous matter, which develops itself between the muscular fibres, causes great apparent thickening of the muscular coat, and, if a transverse section of the coats of the stomach be made in the earlier stages of the disease, gives to the cut edge a very peculiar appearance, which is seen in all the varieties of cancer, and which consists of whitish or bluish-white lines perpendicular to the surface of the mucous coat, and in striking contrast with the red muscular fibres. After a time the muscular fibres waste and degenerate, and what remains of them gets blended with the surrounding cancerous mass, so that this peculiar appearance is lost.

In the submucous cellular tissue the cancerous matter spreads as by infiltration, but much less evenly than in the muscular coats, often forming

lobular masses, which project into the cavity of the stomach.

The mucous membrane, from the invasion of the disease, undergoes various changes, which have been well described by Rokitansky in nearly the following terms :

“ Sometimes it degenerates into an areolar cancerous tissue, which discharges large quantities of gelatinous fluid ; sometimes it is converted into a medullary tissue, and sprouts into fungoid or medullary masses, which suppurate, and thus partially expose the scirrhus cellular tissue ; but most frequently it becomes the seat of a sloe-black softening, with hæmorrhage, and the scirrhus sub-mucous cellular tissue is at length found invested by a thin, gauze-like, black remnant of the mucous membrane, or quite denuded, merely retaining here and there on its surface a few black convoluted vessels.

“ The scirrhus, too, undergoes various metamorphoses. It may, after it has been denuded of the mucous membrane, become gangrenous in large patches, or in round circumscribed spots, the tissue exfoliating by layers, so as to give rise to deep, smooth excavations in the crude cancer, or it may become developed into a more highly organised cancerous growth, such as medullary sarcoma, accompanied by bleeding fungoid tissue ; this soon becomes destroyed by a suppurative process, leaving an ulcer surrounded by an elevated lardaceous margin.”

The diseased mass constitutes a hard, irregular tumour, which can be often felt through the walls of the abdomen.

Soft carcinoma, or medullary, when primary, may



originate in the mucous membrane or in the sub-mucous cellular tissue. The chief points in which it differs, in course and effects, from the varieties of hard carcinoma, are that it grows more rapidly, becomes sooner and more widely disseminated, and sprouts into exuberant medullary or fungoid masses, which undergo rapid transfusion.

Colloid carcinoma appears first as an infiltration of the peculiar jelly-like matter into the submucous cellular tissue, and between the muscular fibres and into the interstices of the mucous coat. This infiltration renders the walls of the stomach much thicker than natural, and gives to a section of the muscular coat the striated appearance above described. The infiltration into the cellular tissue and between the muscular fibres is very even; but the diseased mucous membrane is apt to sprout here and there into roundish spongy masses, the cells of which are filled by the jelly-like matter. After a time, the exposed surface of these projecting spongy masses wears away, the whole inner surface of the diseased mass becomes eroded, all traces of muscular fibres and of mucous membrane disappear, and the walls of the stomach are converted into a gelatiniform tissue, an inch or two thick, in which no traces of the muscular or of the mucous coat are seen.

The disease, like the other varieties of carcinoma, is most common at the pyloric end, which it usually encircles evenly. From this end the disease spreads continuously and evenly towards the splenic end, but it very seldom extends in the opposite direction along the duodenum. In some cases the entire stomach is at length involved, but generally death

occurs before this happens, and the diseased portion then often terminates abruptly, forming a funnel, of which the pyloric ring is the small aperture. The outer surface of the diseased mass is covered by the peritoneum, and, when the disease has extended far, is roughened by the partial projection of unequal semitransparent cells.-

Whatever be the kind of cancer, the ulceration has seldom, if ever, the repulsive smell which is so common in open cancer of other parts, and which is here doubtless prevented by the antiseptic and solvent action of the gastric juice.

The size of the stomach affected with cancer varies greatly, according to the site and extent of the diseased portion. When the disease is limited to the pyloric end, and, by obstructing or narrowing the pyloric orifice or by preventing the free action of the muscular fibres, greatly impedes the passage of the food into the duodenum, the stomach generally gets much enlarged. When, on the contrary, the pyloric orifice is not obstructed or narrowed, and a large portion of the body of the stomach is invaded by the cancer, the stomach sometimes becomes much contracted.

In those cases in which the pyloric orifice is obstructed and the stomach has grown large, the muscular fibres of the stomach are hypertrophied, and the mucous membrane in its big end is frequently found much softened or digested after death.

When cancer of the stomach has existed for some time and reached the surface of the organ, the diseased mass often becomes agglutinated to the liver, or to a cluster of enlarged infiltrated glands behind it.

The disease frequently proves fatal without extending beyond the stomach; but, like carcinoma elsewhere, it is apt, after a time, to become disseminated, and thus to give rise to secondary tumours in other parts of the body.

These secondary or remote effects of the disease vary with the kind of cancer.

In hard and soft carcinoma the mesenteric glands in the neighbourhood of the primary disease or to which the lymphatics of the stomach run, become first infiltrated, and after a time numerous scattered secondary tumours form in the liver.

The symptoms of cancer of the stomach have seldom any characters that are peculiar or especially significant until the disease has existed a considerable time.

The first complaint is generally of a dull pain, or a sense of uneasiness at the pit of the stomach, which comes on gradually, always aggravated by taking food. The pain or uneasiness is attended with impairment of appetite, and with flatulence, heart-burn, and other results of disordered digestion.

As the disease makes progress, the disorder of digestion increases. The patient usually loses all relish for food, is troubled with occasional eructation of a sour fluid, occurring at various hours of the day, and now and then, soon after meals, brings up, in the same manner, small quantities of food. He loses flesh, and in most cases becomes much depressed in spirits. Still he is free from fever; pulse normal; tongue clean or slightly furred; skin natural, and no thirst.

The uneasiness at the epigastrium and the disorder of digestion continue, but the symptoms vary

in some degree according to the seat and extent of the disease. When the cancer involves the body of the stomach and the orifices are unobstructed, vomiting, if it occur at all, occurs soon after meals, and what is brought up at a time is moderate in quantity, and consists of the secretions of the stomach and the food, or portions of the food, recently swallowed.

When, as happens much more frequently, the disease is confined to the pyloric end of the stomach, the pyloric orifice usually becomes obstructed or narrowed, or the passage of the food through it is impeded by the restrained action of the muscular fibres. In such cases vomiting is a necessary result, but it takes place later after meals than in the former class of cases, more is brought up at a time, and the matters vomited are very sour. In many cases, perhaps in all those in which the body of the stomach remains sound, the obstruction of the pyloric orifice leads, after a time, to great enlargement of the stomach. When this has taken place, vomiting occurs more rarely, at the end of each day, or every two or three days, or at still longer intervals, and a great quantity is brought up at once, the matter ejected comprising the accumulated secretions of the stomach and all the food not capable of absorption in the stomach that had been eaten since the last vomiting.

When, on the other hand, the disease involves the cardiac orifice, the entrance of food into the stomach is impeded. The act of swallowing causes pain, or a sense of uneasiness at the epigastrium, passing through to the back; and very commonly a small portion of what is swallowed lodges in the



lower end of the œsophagus, and is immediately or speedily brought up again by an effort of eructation rather than vomiting. The patient himself is aware that the food does not readily enter the stomach.

In all cases where much is rejected by vomiting, and but little consequently passes into the duodenum, the bowels become confined; but where the pylorus is not obstructed, the costiveness is interrupted now and then by a transient diarrhœa, produced by the irritating matters which pass from the stomach into the bowel.

When the cancer involves the body of the stomach or the pylorus, the matters brought up from the stomach, besides the natural secretions of the stomach and portions of the food more or less digested or otherwise altered by some fermentative process, often contain a considerable quantity of glairy mucus, secreted, for the most part, by the diseased portion of the mucous membrane. It sometimes happens, early in the disease, that this mucus is mixed with black or brown flakes, consisting of blackened and altered blood. At a later period, and especially after the ulceration has occurred, an abundant hæmorrhage not unfrequently takes place. A sense of weight or oppression at the epigastrium is then felt, with faintness and nausea, and a large quantity of matter is vomited, which, according to the time the blood remained in the stomach and the quantity of free acid the stomach contained, is of a soot black or of a dirty reddish brown, justifying its familiar comparison with coffee grounds.

But before the disease has advanced thus far the patient has generally lost much of his flesh and



strength, and has a pallid and faded look. By careful examination of the epigastrium we may now generally feel an irregular tumour formed by the cancerous mass. The situation of the tumour of course varies with the site of the disease as regards the stomach itself, and also when the pyloric end is the part diseased, with the degree of displacement which the stomach has undergone.

When the disease involves the cardiac orifice, which does not admit of displacement, or when it occupies the body of the stomach without obstructing the pylorus, the tumour is necessarily in the place which the diseased portion of the stomach naturally occupies.

Most commonly, as we have seen, the disease involves the pyloric end of the stomach. In that case also the tumour is usually felt about the place which the diseased portion naturally occupies; but when the stomach grows large and the diseased portion has not contracted unnatural adhesions to the contiguous fixed parts the pylorus falls in the abdomen, the tumour may be felt much lower down in the right side.

When the aperture of the pylorus is much obstructed, and but little consequently passes from the stomach into the duodenum, the abdomen, except where it may be raised by the tumour or by the distended stomach, is almost always sunk. The intestines contain but little fæcal matter, and, notwithstanding the costiveness, are seldom distended with gas.

The dissemination of colloid carcinoma usually leads to scattered masses over the peritoneum and omentum, and its most striking results are distension of the abdomen and ascites.

While these organic changes are taking place, usually varying from six months to two years, but occasionally, especially in colloid, extending to several years, the patient, worn out by want of nourishment, by pain and broken rest, and it may be by loss of blood, dies of exhaustion, the mental faculties and the senses remaining in the most cases unimpaired almost to the last.

In distinguishing cancer of the stomach, it is very important to consider the time the disease has already lasted and the actual condition of the patient with reference to it. In cancer, the disease makes continual progress, the patient grows gradually thinner, and, in the majority of cases, dies of exhaustion within twelve months, often within two years. Simple ulcer of the stomach may, on the contrary, exist for many years, causing almost constant, and even severe, suffering, but without destroying the appetite or causing much waste of flesh. If the disease, therefore, has existed for several years, or even for many months, without much loss of flesh, the chances are greatly against its being cancer.

*Treatment.*—In cancer of the stomach the chief object of treatment is to lessen the sufferings of the patient. One of the most effectual means of doing this is by properly regulating the diet. In this disease there are many conditions—the destruction of a portion of the digesting membrane by the cancer, the decomposing or unhealthy secretions, the impediments to the natural movements of the stomach which the disease causes, and very frequently obstruction of the pylorus—which tend to prevent the healthy action of the stomach, and give rise to

various disorders of digestion that terribly aggravate the sufferings that are directly attributable to the cancer itself.

It is obvious, when such impediments to healthy digestion exist, that the digestive power should never be over-taxed, and that great care should be taken that the food required to nourish the body is reduced to its most easily digested form. Herein we are indebted to Brand & Co. for their several kinds of extract of meat, and to Valentine and Crosse & Blackwell.

In advanced stages of the disease, when a large portion of the stomach is involved in the cancer and its digestive power is greatly impaired, the food should be such as will pass readily through the pylorus and can undergo some kind of digestion afterwards. Arrowroot, and other light farinaceous food ; beef tea or nicely prepared soup ; the yolk of eggs beaten up and mixed with water and wine ; and a small quantity of the cooked pulp of some fruit, are the substances of which the diet should mainly consist.

Much of the suffering is at all times caused by food which the stomach cannot digest ; and in the final stage of the disease, in some instances, when a digesting fluid is no longer secreted or the pyloric orifice is closed, when, consequently, food distends and oppresses the stomach without supporting the body, marked relief from pain and other discomfort will result from the patient almost entirely ceasing to eat, taking only an occasional spoonful of milk, and supporting the body as much as possible by nourishing enemata.

When there is an excess of acid, much relief is

obtained from neutralising this by lime water and magnesia. While there is great stress of acid in the stomach there is usually a repugnance to food.

When there are fetid eructations, creasote may be given, or a few grains of bisulphite of soda, or some finely powdered wood charcoal.

It is requisite, also, to obviate constipation, which is a very common effect, and which almost always renders the patient more irritable and uneasy than he otherwise would be.

Again, for loss of sleep, harassing pain in the stomach and back, and much nervous irritability, recourse must be had to sedatives. No sedative is so efficient as opium, and probably conium and belladonna, which have the advantage of not confining the bowels and checking the secretions, as opium does.

It is interesting to note the reports of operations on the alimentary tract. The marvellous instances of removal of considerable portions of the intestine, which have recently been performed in Germany, and the fact that one patient of Billroth's, in whom a cancerous pylorus and part of the duodenum were removed and has recovered from the operation, cannot fail to set us thinking about the future of abdominal surgery.

Removal of a cancerous pylorus or of a foot of intestine is not an operation to be undertaken lightly, requiring a most careful selection of cases, and if undertaken the most minute attention to details during the operation.



## CHAPTER XII

### ON SCIRRHOID CARCINOMA OF THE RECTUM

THE symptoms of carcinoma of the rectum, as first brought under notice, vary considerably according to the stage to which the disease has advanced. I will divide, therefore, its consideration into three stages.

In the incipient or first stage the patient almost suddenly becomes sensible of a change from the usual comfort in defæcation, the bowels become irregular, generally suffering from constipation ; very often there is some mucous discharge accompanying the motion or it is streaked with blood ; tenesmus is not unfrequently present ; in some cases there is pain in the bowels, in others none ; dyspepsia, nausea, loss of appetite, and a feeling of discomfort after taking food.

If the rectum be examined by the finger, it will be found (about an inch and a half above the anus, or even higher than this) to be narrowed and more or less hardened.

In the second stage the obstructive symptoms are more decided, pain is frequently present, more especially during defæcation ; muco-purulent or sanguineous discharges are generally noticed, and

the motions have in some cases a flattened, ribbon-like appearance; there is often considerable spasm about the anus.

If the rectum be examined by the finger, it may now disclose the evidences of disease in the shape of hard nodules disposed beneath the mucous tissue. These intruding masses sometimes retain their character of distinct knobs or tumours for a considerable time, affecting the calibre of the rectum by growing inwards; encroaching thus within they produce the ribbon-like stools.

The walls of the intestine close to the stricture will be found materially thickened from infiltration. If ulceration has taken place the finger will be smeared with blood, the hardened ridges being well defined, marking the diseased from the healthy tissue; above this constriction the gut will be found dilated.

It will be found not unfrequently that the scirrhus in the rectum is complicated by fistula, easily to be accounted for, as abscesses ordinarily terminate in the establishment of fistulæ; interference of the disease with the urinary organs inducing retention either by the occurrence of spasmodic stricture, or from actual pressure on the urethra itself by the extension of the growth.

It will be seen that accidental circumstances in the progress of the disease may more frequently determine the duration of life than the existence of the carcinoma itself, for the direction of the surrounding adhesions may lead to perforation of the peritoneum, to penetration of the colon or bladder, or the tendency may be to occlude the passage of the rectum, death in other cases taking place from

gradual exhaustion and infiltration of the disease into other parts of the body.

The third stage of the disease is marked by the more or less complete occlusion of the passage, the bowels become rapidly distended, tender when touched, vomiting occurs and soon becomes constant, until at length nothing can be retained on the stomach; the patient becomes rapidly weaker, until death takes place either from exhaustion or from the supervention of some acute inflammation, which is not unfrequently determined by rupture of the bowel and discharge of its contents into the peritoneum.

*Treatment.*—In the first stage the diet should be carefully regulated: if constipation should occur an attempt should be made to obviate it by some suitable change in the food rather than by the administration of medicines or the use of enemata.

In the second stage even more care will be necessary in regard to diet. Here, milk in abundance, eggs with fresh meat should be taken, whilst farinaceous and other vegetable materials should be limited in amount; oleaginous matters, such as glycerine, olive or cod-liver oils, should form part of the daily dietary; this will greatly add to the comfort of defæcation.

In this stage the local symptoms will most probably urgently demand interference, in consequence of the tendency which the disease then exhibits to narrow or even to close altogether the passage; one of two things will then present themselves to be done, either the complete excision of the part of the bowel implicated, or the continued use of dilating bougies; much relief may be obtained by the regular

use of bougies passed through the narrowed part of the gut; they should be introduced into the bowel with the utmost gentleness, so as gradually to overcome the obstacle to defæcation. It is good practice previously to the introduction of any bougie, that the width of the strictured canal should be carefully estimated, so as to avoid the use of too large an instrument; as a rule, it should be passed every second day, immediately preceding the customary time of defæcation; having once fairly carried the bougie beyond the obstruction it should then be at once withdrawn. The use of the bougie must not be abandoned for one moment in any hope that the escape of the fæces established by its means will persist for a week without its aid; as long as the calibre of the gut can be maintained in this way the use of enemata is not indicated.

When the time comes in the course of this disease that the contraction of the bowel will no longer permit the escape of fæces, then the only mode of relief left for the patient is by opening the colon, and establishing an artificial anus; as this proceeding can exercise but little salutary action on the growth itself, it must be looked on as merely a means of prolonging life, and I must say that there are instances in which the surgeon is most justly called on to acquiesce in the wishes of the patient, and even to recommend an operation of which, whatever else may be said against it, it cannot be said that it is in itself dangerous to life.

If it is performed at all it ought to be practised at the very commencement, not at the end of the third stage; the obvious advantages of this view are manifest in the better prospect there would exist of



prolonging life, moreover, I conceive that the satisfactory escape of fæces through the artificial anus would, in many instances, afford the surgeon opportunities in which attempts, not otherwise practicable, might fairly be made to restore the passage through the diseased bowel by complete extirpation of the diseased parts.

## CHAPTER XIII

### ON SCIRRHOID CARCINOMA OF THE TESTIS

CARCINOMA is a growth originating in proliferation of the epithelium of the gland. Its alveolar structure is generally pronounced, its cells increase by endogenous multiplication. Following the general history of true carcinoma, development in the testis can be traced from the tubules. The change is here effected mainly by the action of the epithelium, the cells of which multiply, fill, and dilate the tubules, and thence spread into the surrounding tissue.

True scirrhus tumours of the testis are no doubt rare. The only form of carcinoma with which one meets with is the soft variety. Scirrhus seldom affects more than one testicle. The scrotum after a time becomes adherent to the testis, the superficial veins become tortuous and full, the disease infiltrates itself along the cord to the inguinal glands, to the pelvic and lumbar, œdema either of one or both legs. Affection of the glands of the abdomen is found in almost every case. The lungs and liver are also the seat of secondary growths.

Although after twenty years no age is free from its occurrence, carcinoma of the testis is most frequent between the ages of thirty and forty or thirty and forty-five. Before the age of ten carci-

noma is rare, perhaps for the following reasons : first, the little liability to cancerous degeneration of epithelium of any part at so early an age ; second, the inactive condition of the epithelium of the testis before the age of puberty.

## CHAPTER XIV

### HÆMATOID CARCINOMA OR FUNGUS HÆMATODES

HÆMATOID carcinoma or fungus hæmatodes are very soft and rapidly growing tumours, whether carcinomatous or sarcomatous in type; they are supplied with very delicate capillary networks, and these fine vessels, when separated by careful washing from the cell-elements of the growth, are seen to be variously dilated, the vessel wall yielding in the direction of least support. This is particularly the case where fatty degeneration advances as rapidly as cell-proliferation, and it is specially in such instances that, the vessels bursting, large quantities of blood are poured out, and by their subsequent changes diversify with such rich colours the cut surfaces of the growths; this accidental hæmorrhage happens in a greater or less degree with every soft new growth.



## CHAPTER XV

### ON MELANOID CARCINOMA

As to the nature of the disease, melanoid carcinoma or "black cancer" are really instances of sarcoma with black pigment superadded. The scirrroid carcinoma, comparatively rarely, however, becomes associated with melanosis; the black tint is due to a certain proportion of the cells containing granules of pigment.

## CHAPTER XVI

### ON COLLOID CARCINOMA

TRUE colloid owes its characters to the presence of mucus, but in the form of a degeneration—colloid nodules are met with in many examples of carcinoma and sarcoma and also in cases of epithelioma—one will find even a single cell amongst the true carcinoma cells, with large refracting clear spaces within them, distending the whole cell. Where this change is general a peculiar jelly-like aspect is given to the growth, which can yet be seen to be a genuine infiltration. The effect of this accumulation of mucus within and between the cells is to alter the microscopic appearances as greatly as the coarser characters. Single oval cells become enormously distended, the nucleus remaining near the periphery, and the rest of the swollen cell being marked with faint concentric lines (possibly indicating successive stages in the mucus accumulations).

When a multi-nucleated cell is affected, the group of nuclei is surrounded by the same crease-like lines, and when from the over-distension of many cells a distribution of the contained mucus through the stretched alveoli takes place, large spherical spaces are formed, in which the remains of cells and

nuclei in the centre are surrounded by these singular concentric faint lines. The fibrous stroma, however, may remain comparatively unaffected, although much stretched, and broad tracts of waving fibres with oat-shaped nuclei may be traced mapping out the growth into round or oval alveoli of various dimensions. These appearances have gained for the

FIG. 7.



FIG. 7.—Colloid carcinoma, showing the fibrous stroma, the spaces filled with clear mucus; cells grouped in the alveolus. The detached cells to the right exhibit in a marked degree the change which has affected to a less extent those still grouped in the alveolus. Magnified 220 times.

tumour the name of alveolar cancer; but it has been already shown that all carcinoma are essentially alveolar. It is only that here, the alveoli being distended with a clear fluid, their arrangement is more discernible.

It is to be noted that in some cases of colloid carcinoma the cells themselves are quite free from

any but the ordinary fatty degeneration. The viscid mucoid fluid appears to be poured into the alveoli from some other source, leaving the unaltered cells squeezed into clusters in the centre of the greatly enlarged spaces.

## CHAPTER XVII

### MYXOMATOID CARCINOMA

MYXOMA is a tumour of mucous tissue ; similar as are the coarser characters of these tumours to those of colloid, the microscopic structure is very different. Myxoma in its purest form resembles a lump of jelly limited by a very thin capsule, and separated into lobules of varying sizes by delicate curving and interlacing fibres. When cut into, the knife drags out of the tumour long viscid strings of clear fluid, and the same fluid wells freely from the cut surface, and flows away in a bulky stream. This fluid gives the characteristic reactions of mucus ; namely, it is coagulable by heat and vegetable acids, and forms a precipitate with mineral acids, soluble in excess of the acid. Its mode of coagulation in spirit is also peculiar, for instead of forming dense flocculi, as albuminous fluids do, its fall through the spirit is marked by circling streaks and slender ribands of opacity. A little bit of fibrous stroma teased out or pressed between glasses shows a very definite structure, cells of either a spindle or irregular shape branching off into long, slender, communicating fibrils, which by their interlacing form an extremely delicate spongy tissue, pervading the tumour and holding the mucus in its meshes. Such cell structure is shown in the annexed microscopic field, being



taken from a pure myxoma, the size of a foetal head, from an elderly woman, lying between the muscles of her thigh.

FIG. 8.



FIG. 8.—A specimen of pure myxoma, showing the entangled meshwork of very delicate fibres, and branched cells which formed the bulk of the tumour, viscid glairy fluid, having mucus filling the interstices. It will be seen that the difference between this structure and that represented by colloid carcinoma is very striking, although the aspect of the two growths to the unaided eye may be very similar. Magnified 220 times.

Myxoma is very rarely malignant, and hence it is important to distinguish it from colloid degenerations of such formidable growths as sarcoma and carcinoma.

## CHAPTER XVIII

### B. SARCOMA

SARCOMA may be defined to be a tumour of connective tissue origin, formed generally of embryonic tissues and without alveolar structure, composed of round, or fusiform, or giant cells, and these are packed in a more or less abundant basis; the vessels are often mere fissures between the cells, and the cells increase in number by division. The new tissue often traversed by fibrous tissue, and not uncommonly exhibiting a delicate reticulated structure, or of fusiform or spindle cells, arranged in the form of trabeculæ, which interlace, join, and cross each other at various angles. Sometimes, mixed with these two forms, there occur stellate cells in a viscid or hyaline basis, or hyaline cartilage may be found forming either a kind of framework through the growth or perhaps a large portion of its bulk.

The alveolar structure found in some sarcomas is rarely so perfect as that of most epithelial tumours, such as carcinoma; indeed, careful study discovers that the tissue which surrounds the alveoli is generally formed of spindle cells. There is in most cases no real difficulty in assigning each tumour to its class. But where the characters which should be distinguished are not clearly marked, and the

origin cannot be ascertained, the tumour must be left unclassified.

It is probable that by far the greater number of "soft cancers" and "firm medullary cancers" recorded in English publications are really sarcomas; and if we were to limit the term "cancer" to "carcinoma," as here anatomically defined, we should probably be surprised to find how very rarely true medullary or "soft" cancer is met with by surgeons.

Nearly all melanotic growths, for instance, and all the primary soft cancers of bone, would probably be more correctly classed with sarcomata, a fair proportion of "villous cancers," and at least a third of the cancers affecting the uterus and rectum would find a place amongst the epitheliomata, whilst all "medullary cancers" of the eyeball in young children are really gliomas.

Although all three varieties of new growth are truly and formidably malignant, they exhibit the property in very different and definite degrees.

Thus, sarcoma, although in certain forms nearly as prone as carcinoma to infect remote parts, very rarely invades the lymphatic glands, and probably seldom appears as a secondary tumour until a comparatively late stage in the disease; hence the greater hope of a successful issue of any operation attempted for the removal of a sarcomatous growth, provided that the affected limb be divided at a safe distance from the tumour. Where this is not possible, as in certain cases of mammary sarcoma, although the patient may live long with no visceral or glandular complications, yet the local growth itself will be very apt to return with great perti-

nacity; the reason being that sarcoma is essentially an infiltrating or tissue-invading growth as carcinoma, and equally difficult to extirpate without a freer use of the knife than is commonly deemed necessary.

The main distinctive characters of sarcoma are to be sought for solely in the form and arrangement of its microscopic elements, and a sarcoma may be described as a tumour made up of embryonic tissue, which may tend towards development into a perfect tissue. Hence sarcoma is almost entirely a cellular growth, with more or less of visible inter-cellular substance, and the cells are usually of a spindle or fusiform type.

Although the presence of one form of cell in each tumour is the rule, it is not uncommon to meet with considerable variety in the size or shape of the component cells in a single tumour; and in classifying the sarcomata, therefore, one must have regard to the prevailing form of cell rather than to the exclusive presence of any one form. Thus, one may meet with fine oat-shaped, large plump spindle, small or large oval, small round, and huge myeloid cells; and according to the proportion in which any one of these forms preponderates sarcomatous tumours are subdivided:—1. Spindle cell; 2. Round or oval cell; 3. Giant cell or myeloid; 4. Mixed celled. 5. Besides these general varieties sarcoma takes a special form and receives a special name, glioma, when affecting the neuroglia or fine connective tissue of the nervous system.

In all these several varieties, however, the one character remains, namely, that the bulk of the tumour is built up of simple cells bound together by

a scanty homogeneous or granular semi-fluid substance. Hence a marked distinction from carcinoma, in which the cells are, as a rule, quite free from a visible intercellular material and float in the meshes of a fibrous stroma. A further difference is seen in the form of the component cells. It has been already said that the cells of carcinoma are of an epithelial type. Now cells of this kind are very rarely met with in sarcoma. One does, indeed, occasionally meet with a formidable variety of sarcoma, in which huge angular and many-tailed cells are interspersed with the spindle cells forming the bulk of the tumour, and a scraping of such a growth might readily mislead an observer. But, in the great majority of cases, the cells of sarcoma, when they are not simply elongated and disposed in regular tracts, are plump and round and oval rather than angular, for they are embedded in a soft fundamental substance and are so not subjected to the changes of form brought about by mutual pressure as in the case of the cell elements of carcinoma. The semi-solid intercellular substance also accounts for the comparatively scanty juice yielded on scraping any but the softest sarcomas. This juice is also less freely miscible with water than that of carcinoma, the cells cohering in little flakes; and, in examining thin sections, very few detached cells float out into the water or glycerine in which the section is immersed, instead of the large number of cells so detached in carcinoma.

1. Spindle-cell sarcoma is by far the most common of all these tumours. Springing from connective tissue, and assuming the form met with in the development of granulation tissue into the fibrous



texture of a scar, one meets with considerable differences in the size and appearance of the cells, which may vary from an extremely slender fusiform shape, barely distended in the centre by a small elongated nucleus, to a plump cell with large oval nucleus and delicate tapering extremities.

FIG. 9.



FIG. 9.—A thin edge of a section of a remarkable spindle-cell sarcoma. The great feature in the section being the number of huge irregular cells intermingled with the spindle cells, showing several larger cells, rendering their wide departure from the ordinary type the more noticeable. Magnified 220 times.

Whichever variety be present, a certain definite arrangement of the cells prevails, their axes being parallel to one another, and broad waving tracts of such parallel cell crossing and recrossing through the tumour. A scraping generally shows sufficiently the type of cell present, but viewed in section the shape of the individual cells is by no means always so easily made out. The regular arrangement of

oval or elongated nuclei, and the occurrence here and there of patches are apparently small round cells enclosed by these others, in reality similar bands running at right angles to the first, and so cut across transversely is tolerably suggestive; but at the edges of such a section one may generally see the fine tails bristling out, if indeed there be not a free cell or two showing yet more distinctly their precise form. In some parts of these tumours the spindle-cell growth gradually passes into ordinary connective or white fibrous tissue, in such a manner as to render it impossible to say whether the spindle cells are developing into the formed tissue, or whether they are themselves derived from this by a retrograde metamorphosis to an embryonic condition. Besides this common admixture of connective tissue, spindle cells form the basis of other sarcomatous tumours occurring in small number, indeed, in the round- and oval-cell growths, but rarely wholly absent. A curious feature of this growth is the tendency shown by its elements to assume a larger, plumper form with each recurrence, and, together with this alteration in the size of the component cells, to exhibit an increased rapidity of growth and proneness to infiltration.

Spindle-cell sarcoma, including, as it does, the tumours long recognised as fibro-plastic, recurrent fibroid, fibro-cellular, and many of the medullary sarcomata, exhibits very different degrees of malignancy in different cases, so that the prognosis is specially uncertain in the case of this growth. Local recurrence may in almost all cases be predicted where the knife has not gone quite clear of the affected tissues, for this form of tumour, usually described as

encapsuled or spreading only in the connective tissue, occasionally exhibits distinct infiltration of other textures, invading muscular tissue, and breaking up the striped fibres in quite as destructive a manner as any carcinoma.

FIG. 10.



FIG. 10.—A thin section of a spindle-cell sarcoma, showing the considerable admixture of cells of other shapes not unfrequently met with, and also showing how the muscular fibres in the vicinity of the new growth are invaded by it. The genuine infiltration of normal tissues is here as well marked as it is in any carcinoma. The arrangement of the cells, however, the amount of visible substance separating them, and the absence of any fibroid stroma, sufficiently distinguish this growth from carcinoma, as shown in Fig. 5. Magnified 220 times.

Infection of remote parts is also not very uncommon; spindle-celled growths have been met with in the liver, lungs, and mesentery; but such secondary growths are very rarely found in the lymphatic glands.

It is probable that a careful consideration of the microscopic structure offers valuable indications for

a prognosis, those tumours being more apt to show true malignancy whose elements are plump and interspersed with large, irregular, and multinucleated cells. Special regard must, of course, be had to the rapidity of the growth, its consistence, and its seat. Where, for instance, the tumour is distinctly encapsuled, and even pedunculated, the prognosis would be infinitively more favorable than where the growth infiltrates a soft, moist part, subjected to constant movement.

2. Besides the spindle-cell growth which constitutes the bulk of most of the sarcomata, certain of these tumours are made up of a still lower type—embryonic cells—consisting merely of little lumps of nucleated protoplasm, which, held together by a nearly fluid connecting-material, show but little tendency to assume an elongated form by regular pressure on the sides, but remain as soft, spherical, or ovoid cells, like those met with in granulations, although occasionally considerably larger. Tumours possessing this structure are generally very soft, and from their consistence and general appearance, as well as from their microscopic characters, are more liable than any other form of neoplasm to be mistaken for medullary or “soft” carcinoma. These tumours are very vascular, the vessels being usually simple channels through the cell-tissue, with walls formed by the cells; and hence the very frequent rupture of the vessels, and escape of blood into the substance of the tumour, sometimes to such an extent as to give rise to a large blood-cyst, which by its size may mask the real nature of its origin. The cells themselves are also very fragile, so that it is unusual to prepare either a scraping or a section of one of



these growths without allowing a large number of free nuclei to escape. Seen in section, it is often even more difficult to recognise the precise form of the cells than in the fusiform variety.

The usual appearance is that of an amorphous or granular substance in which large or small round or oval nuclei, with bright nucleoli, are embedded. At the edges of the section the rounded outline of the soft cells may be recognised, and in little detached bits of the section their shape becomes yet more

FIG. 11.



FIG. 11.—Section of a large oval-cell sarcoma, showing cells resembling those of carcinoma. Magnified 220 times.

distinct. The size and shape of such detached cells suggest at once the occasional difficulty in distinguishing these tumours from carcinoma. The cells are, indeed, somewhat plumper and less like epithelial elements than are the ordinary cells of carcinoma, and there is usually some amount of visible intercellular substance; but where the stroma is fibrillated, as is sometimes the case, and fibrillated in such a way as to suggest a meshwork like the alveolar stroma of carcinoma, the distinction between



the two is one of the most difficult points in pathology.

The more usual form of round-cell sarcoma is made up of much smaller cells than those just described, cells closely resembling leucocytes or the first cells of a granulation; and since these minute cells are mostly about the size of blood or lymph corpuscles, the distinction between this form of growth and lymphadenoma is sometimes as difficult to draw as is the distinction between the larger oval-cell sarcoma and soft carcinoma. This small round-cell tumour differs from true lymphadenoma mainly in lacking the fine reticulated stroma of the latter neoplasm. The cells are separated by a variable amount of semi-fluid granular substance; but occasionally an appearance as of fine fibrillæ branching amongst the cells is met with, and when this is the case the growth is to be distinguished from lymphadenoma by the absence of minute nuclei in the angles of the network to be hereafter described as characteristic of that structure.

Round-cell sarcoma is a distinctly infiltrating growth, as may be seen in the subjoined field taken from a thin section of one of these tumours springing from the fibula and blending with the muscles of the calf. (Fig. 12.)

Remains of striped muscle-fibres, broken up and invaded by the new growth, sufficiently demonstrate its destructive character, and show that the muscle is not merely wasted by the pressure of the increasing mass in its neighbourhood.

The structure of this tumour closely resembles what is to be met with in the vicinity of nearly all active new growths. As these advance they send

before them, so to say, "leaders," of this "indifferent granulation material," which stretch out into the surrounding structures, and form the first histological indication of the march of the morbid change.

FIG. 12

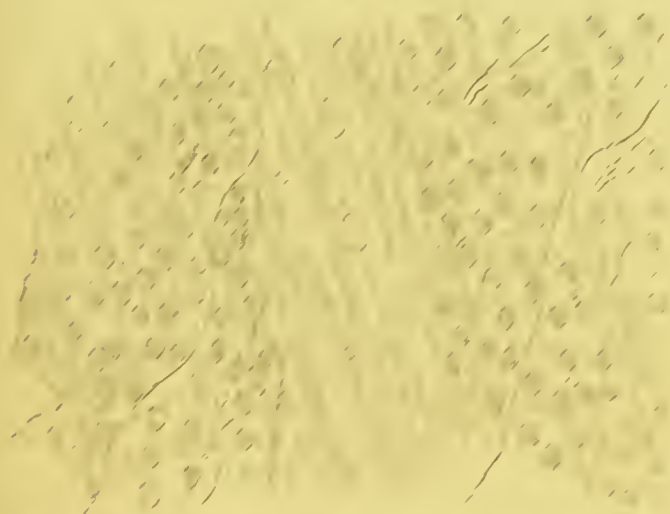


FIG. 12.—Small round-cell carcinoma infiltrating muscle, showing nuclei of the striped muscle-fibres. Magnified 250 times.

Reference has been made to this tissue in the description of the early stages of carcinoma. The peculiarity about the growth now occupying our attention is, that the whole bulk of the possibly enormous mass is made up of the same simple small corpuscular structure. To establish this fact it is of course necessary to take a scraping or section from three or four different parts of the tumour under examination. Such an investigation may show the prevailing type of cell to be of another kind, these small round corpuscles merely spreading about the margins of the growth; and so the tumour may receive a different name, and perchance a

corresponding difference may be required in the prognosis of the case. These round and oval-cell sarcomas are usually very soft, white, or variously mottled by the results of blood extravasations, blending intimately with the structures amongst which they lie, and readily exuding a creamy juice filled with the cells and escaped nuclei of the tumour. They are far more apt to infect lymphatic glands

FIG. 13.

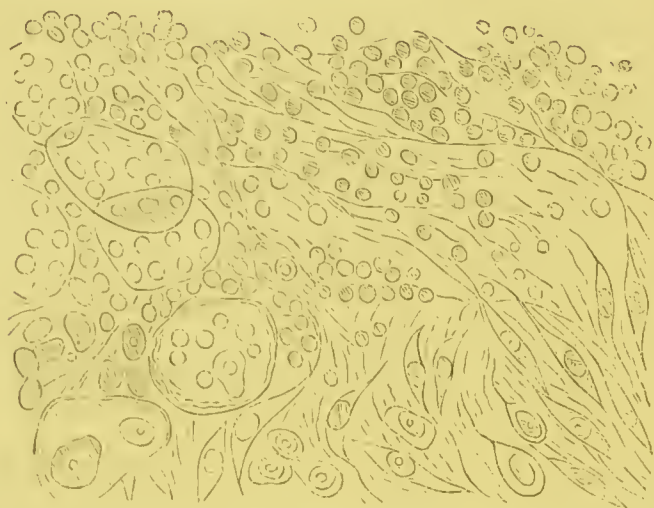


FIG. 13.—Section taken from the margin of a spindle-cell sarcoma. The lower part of the field represents the structure of the bulk of the new growth, whilst the small cells, stretching out into the adipose tissue, show one mode of infiltration and growth of sarcoma, namely, by “indifferent granulation material” invading the neighbouring tissues. Magnified 220 times.

than are the spindle-cell varieties, and, as a general rule, are also far more rapid in their destructive course.

3. Myeloid sarcoma is a form of the spindle-cell variety, in which a distinctive feature is given to

the growth by the presence, in considerable number, of the large plate-like masses of nucleated protoplasm, normal in foetal bone marrow. But it must be borne in mind that these singular cell-masses are met with under many different circumstances as well as in the tumours springing from the medullary cavities of bones. It is probable that few spindle-cell sarcomas from any part of the body could be thoroughly examined without some myeloid or giant-cells being found. But in certain sarcomatous tumours springing from bone, and especially from the medullary cavity of the bone, these giant cells occur in such number as to offer a convenient characteristic by which to classify the growths exhibiting them.

FIG. 14.

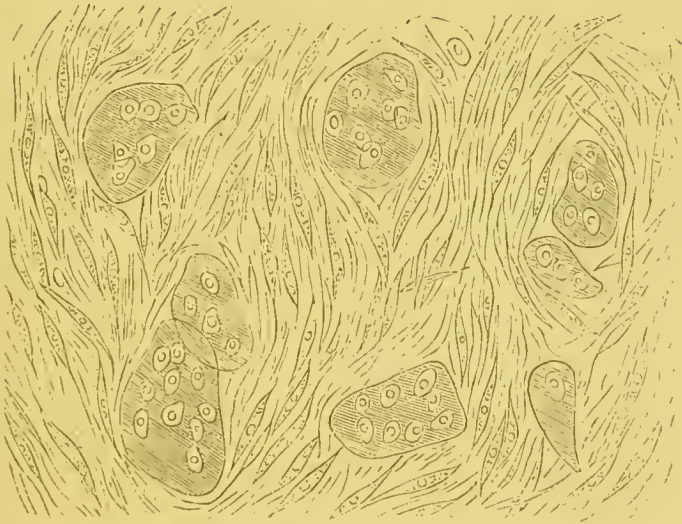


FIG. 14.—Myeloid sarcoma, showing the giant cell masses.  
Magnified 220 times.

These myeloid growths are usually much firmer than the other varieties of sarcoma, approaching more nearly to the density of fibromas; their cut surface has a smooth, fleshy look, unlike the fasci-



culated appearance of the firmer spindle-cell varieties, and they yield a scanty juice to the knife scraping them. They are very commonly met with springing from the periosteum of the jaw (where they are usually styled fibrous epulis; the above field is taken from an epulis), and about the centre and the ends of the long bones, but they may be met with in other situations. They are probably less malignant than many forms of sarcoma, but they are very apt to recur after apparently careful removal, and secondary growths have been occasionally met with in the lymphatic glands, lungs, liver, etc.

Microscopically the diagnosis of this form of sarcoma is sufficiently simple. Embedded in a tissue made up of small oat-shaped cells (with which small round and oval cells may be mixed) are large, pale, irregular cells, containing small, bright, oval nuclei with nucleoli. These last cells have often the appearance of flat plates rather than spherical or ovoid masses of protoplasm, and vary in size from a tiny cell containing a single nucleus to a very large mass holding a score or more of similar nuclei.

The myeloid or giant cell may then be described as a mass of protoplasm, usually of large size, flattened, plate like, and containing from two or three to many nuclei. Its form may vary considerably, so may the number of its nuclei, but large size and many nuclei are its characteristic features.

Such cells may occur not only in the central, but in the subperiosteal or superficial osseous sarcomatous tumours, especially in close proximity to bone. Such cells may occur, too, in tumours of the soft parts wholly unconnected with bones, or may be found among the products of certain inflamma-



tions, especially those of bone. Such cells as these never occur in numbers so large as to form the bulk of a tumour of the soft parts, or even of a subperiosteal or superficial bone tumour. Their presence in such quantity in sarcoma of central origin in bone may be explained on the theory that they are derived from the remains or still existing germs of the many-nucleated cells of foetal marrow, or on the theory that they are connected with the destruction of the bone, which invariably occurs during the growth of central tumours.

In a tumour of bone of central origin these giant or myeloid cells may form "as much as four fifths of a central tumour, but never comprise its whole bulk, for with them are always mingled round or, more often, spindle-cells." "A tumour which has grown far beyond the limits of the bone in which it took origin may still be composed of four fifths of giant cells." "A tumour which contains them in great abundance exhibits a maroon or dark red colour, or a fleshy colour and appearance, likened to that of the muscular substance of the mammalian heart, and peculiar to these and no other tumours."

4. Mixed sarcomatous tumours are sometimes so puzzling that they need some remark. When one remembers that a sarcoma is merely a tumour resulting from the reversion of healthy connective tissue to a foetal type, the cells of which continue to multiply without, as a rule, undergoing any special differentiation into a normal adult tissue, one is prepared to meet with a tendency to a development of different forms of connective tissue in various sarcomas, and even in several parts of the same tumour. Now, since the histological group of

"connective tissues" includes mucous, areolar, fibrous, elastic, fatty, cartilaginous, and bony tissues, there need be nothing very surprising in meeting with a tumour presenting a combination of all these varieties more or less completely developed; and it does sometimes happen that nearly all these structures may be encountered in different parts of the same tumour. Where this is the case the point of chief prognostic importance is the amount of primitive cell-structure showing no such development. Where this is great, the bulk of the tumour presenting a simple cellular structure, the presence of well-marked cartilage or bone here or there is no surety of the innocence of the tumour. Secondary formations, in which the spindle or other cell-forms predominate, may be expected; but where the greater portion of the tumour exhibits some one fairly developed adult tissue (and especially where this tissue is strictly homologous, as lipoma amongst fat, or fibroma in fascia), the prognosis is more favorable, provided that the tumour itself is thoroughly extirpated.

## CHAPTER XIX

### SARCOMA OF THE BREAST

SARCOMA of the breast almost invariably commences as a small rounded tumour having an irregular, lobulated surface. It is always soft and elastic to the touch, sometimes so soft that it imparts a distinct sense of fluctuation to the finger, and it is, in fact, almost impossible to distinguish it by the touch from a collection of fluid contained in a cyst, becoming more marked as the tumours increase in size. These tumours usually grow with very great rapidity, but they have very little, if any, tendency to contract adhesions either to the skin or to the muscles beneath them. The skin does not become infiltrated with the cancerous matter as it does in scirrhus ; and when the growths are of small size it is usually movable over them. More or less pain, of an intermittent, lancinating character, is generally present, even from their first appearance, but it is seldom very severe at this stage. The nipple is seldom retracted, the axillary glands are also often quite free from tenderness or enlargement, and the general health of the patient may be quite unaffected until the disease has advanced to what we may term its second stage. As the disease progresses the skin covering it

becomes thin, of a dusky red colour, and marked by enlarged superficial veins. The tumour becomes much softer, the pain becomes more severe and constant, the patient emaciates rapidly and becomes of a sallow colour, and the skin covering the tumour at length either cracks or a small slough appears. Very copious discharges of blood now frequently occur; the ulcerated surface extends with great rapidity, its edges are hard, irregular, and everted; the bleeding fungous growths sprout from its surface and margins. In the intervals between the attacks of hæmorrhage there is a constant very offensive ichorous or sanguino-purulent discharge; the patient's strength now fails rapidly; copious perspirations or diarrhœa frequently occur, often accompanied by the symptoms produced by secondary deposits in the liver or lungs; and the patient dies exhausted unless previously cut off by an attack of pleurisy, pneumonia, or some other acute disease. The progress of these cases is often very materially hastened by incisions or punctures which have been rashly made into the tumour on the supposition that they were abscesses or other collections of fluid; fungous growths, which bleed profusely, protrude from the incision or puncture; the processes of ulceration and sloughing are established, and seem to advance with more than ordinary rapidity; and death soon terminates the sufferings of the patient.

The only form of malignant disease with which round-cell sarcoma of the breast can be confounded is the acute or soft and rapidly-growing variety of scirrhus carcinoma. These, however, never attain anything like the size of the sarcomatous tumour,



for scirrhus usually commence as infiltrations of the breast tissues, the nipple is generally retracted very early in their progress, and they soon involve the skin and surrounding parts. The axillary glands are also usually affected at a much earlier period than they are, if ever they become enlarged, in sarcoma.

Spindle-cell sarcoma of the breast is more firm and more likely to be mistaken for scirrroid carcinoma, but as a rule these tumours present, after every recurrence, a less and less similarity to fibrous tissue. They become softer and more vascular, and have a great tendency to infiltrate surrounding parts; but the history of their removal and return, without any implication of the lymphatic glands, their smaller size, and the less degree of pain accompanying them, will enable one to distinguish them without much difficulty from scirrhus. They are very closely allied to the round-cell variety. The following very interesting case will illustrate these remarks.

Sarah Eldridge, aged twenty-three, married, a dark-haired, sallow-complexioned woman, was admitted to hospital under my colleague, Dr Marsden, on the 23rd May, 1876. About fourteen months previously she, for the first time, noticed a movable tumour, of the size of a marble, hard and incompressible, and situated on the upper half of the right breast. It was painless, and remained stationary for six months. It then rapidly grew and continued to do so up to the time of her admission. She commenced menstruating early, and was married at nineteen; she had one child at the full period, and had several miscarriages; she never suckled with



this breast, and in no way received any injury. No history of cancer in her family.

The breast presented a perfectly uniform enlargement of its entire structure. No separate tumour could be discovered. In size it was as large as a child's head at twelve months. Numerous clear veins traversed its surface, but otherwise the integuments, as well as the nipple, were unaltered. At the upper part a distinct sense of fluctuation was perceptible, elsewhere the general feeling was one of great firmness. The left breast was atrophied. The neighbouring glands were unaffected.

On the 9th of June the breast was removed. The skin being abundant and non-adherent, a considerable portion was taken away, sufficient being left to bring the edges together. The interior section of the tumour presented several small cysts, but the main body of the growth was solid, and in colour, consistence, and general appearance, it bore a marked resemblance to sarcoma; microscopic examination revealed spindle cells and round cells. The patient made a good recovery, and was discharged.

September 30th, 1877.—S. E— was again admitted into the hospital, and this time under my care. Nine months after the last operation a small lump had appeared above the line of the cicatrix. This grew slowly, and only seemed to make rapid progress during the last six months. Her general health was satisfactory. The tumour was now as large as an orange, situated above the line of the cicatrix; it was freely movable in the cellular membrane and non-adherent to the skin. To the finger it was soft and elastic and highly vascular. Its growth had been unattended with pain.

October 6th.—I removed the disease. It greatly resembled the tumour first removed in appearance, and was more than usually vascular.

November 5th.—The wound having healed soundly she was discharged.

June 20th, 1878.—On examination this day I discovered a small movable tumour just above the line of the cicatrix, but not attached to it. She looked pale and ill, and stated that there had been a good deal of pain about this growth. I advised her speedy admission that it might be removed.

July 23rd, 1878.—Since last record a second tumour has shown itself. The larger and first described situated above, and the smaller below the line of the last cicatrix. In characters they are identical with their predecessors, and were growing rapidly, having attained a size equal to a goose's and hen's egg respectively. I again advised her speedy admission that they might be removed; she would not come into hospital, but consented to my operating on her at home.

August 1st.—I removed these growths; there was unusual hæmorrhage. They were embedded in the cellular membrane as before, and had the same physical appearances as the other tumours.

21st.—The wounds are quite healed.

Early in January, 1879, S. E— found that there was again a growth situated above the lines of the cicatrix. This, after being permitted to attain the size of a hen's egg, I removed on the 25th February. Its structure was similar in all respects to the former ones. After this, her health being firmly established, S. E— discharged her duties with apparent ease.

In February, 1880, some twelve months after the last operation, another tumour appeared. It was not larger than a marble when I first examined it, and was situated, like its fellows, in the cellular membrane above a line of the cicatrix. It was free from pain; in other respects it was similar to those that had been already removed.

It was with difficulty and hesitation that I was made acquainted with this return, notwithstanding I invariably inquired as to her condition. Familiarity with the recurring necessity for the knife served only to aggravate her alarm at the near prospect of its application. I was unable to persuade her to submit to another operation, though I earnestly begged of her to have the tumour removed whilst her health was unaffected.

In November, 1880, she began to complain of sickness and want of appetite, accompanied by slight cough and fever. Her flesh became more sallow in colour, and well-marked cachexia set in. In a little while she gave up her duties, and took to her bed with increasing weakness.

About the 1st of January, 1881, she spat up clots of blood having the shape of bronchial tubes. There was absolute dulness over the lower part of the left lung with absence of respiratory murmur.

On the 1st of February distressing and incessant sickness marked every hour until her death; she could retain positively nothing on her stomach for more than a few minutes together. The sputa were occasionally rusty coloured, and at times contained pure blood. Exhaustion rapidly followed, and she died on the 7th.

*Post mortem*.—External aspect of body yellow and emaciated in the extreme. \*

*Thorax*.—The left lung was occupied throughout by a deposit similar to the external tumours previously removed in structure and appearance. In various places it had commenced to soften, and in others it was altogether disintegrated.

The right lung was free from disease. The remaining organs were healthy. There were no enlarged glands.

The external tumour was very small and hard, entirely unlike the tumours above described, and bearing a close resemblance in structure to an ordinary spindle-cell sarcoma.

When the integuments covering a proliferous cyst in the breast have given way and fungous protrusions have occurred, the appearance presented by the disease may be readily mistaken for that of soft cancer in its ulcerating stage, and this error is, of course, more likely to be committed when the original disease has been removed and the proliferous growth has speedily reappeared in the same situation.

## CHAPTER XX

### ON SARCOMA OF THE TESTIS

SARCOMA attacks the testicle at any age, but the disease is most frequent at two periods of life, the first period extending from birth to ten years old, the second corresponding with a period during which we find that men are most liable to carcinoma from thirty to forty-five.

Both testes are occasionally affected by sarcoma; its first appearance is often attributed to the effects of a slight blow or strain.

The total duration of the disease is rather longer in patients with spindle-, than in those with round-cell sarcoma, in spindle-cell living an average of three years, in round-cell living only an average of two years, and it may be remarked that generalisation of the disease in spindle-cell sarcoma is never so extensive as that occurring in round-cell tumours.

Sarcoma appears to originate in the connective-tissue walls of the tubuli seminiferi or in the tissue between the tubules. The new growth increasing, gradually separates the tubules more widely from each other and at the same time diminishes their calibre and destroys their natural form. But for a long time, even in tumours of large size, tubules can still be recognised scattered



at irregular intervals through the growth, perhaps still lined with epithelial cells or with the remains of epithelium. The new tissue generally takes the form of vast numbers of round cells embedded in a somewhat scanty basis substance, often traversed by fibrous tissue, and not uncommonly exhibiting a delicate reticulated structure, or of fusiform or spindle cells arranged in the form of trabeculæ, which interlace, join, and cross each other at various angles; sometimes, mixed with either of these two forms, there occur stellate cells in a viscid or hyaline basis, or hyaline cartilage may be found, forming either a kind of framework through the growth or perhaps portion of its bulk. For cartilage and sarcoma tissue both belong to the connective tissues, and although the presence of cartilage proves that the tumour is a sarcoma the absence of cartilage does not prove it to be a carcinoma. Regarding the characters in which sarcoma and carcinoma differ, I think it will be found that the cases of sarcoma differ more markedly from one another than do the cases of sarcoma from those of carcinoma.

For a long time, and in some cases altogether, the tunica albuginea resists the advance of the disease, but at length giving way, the scrotum becomes distended, the numerous veins on its surface become enlarged, and its rugæ disappear. If the growth be of large size the position of the raphe becomes changed from the median line and the penis is tucked in. Not unfrequently there is hydrocele of the tunica vaginalis before the tunica albuginea has given way.

In the second stage the general health is affected;

coincident with this the internal lymphatic glands take on enlargement; after a time the secondary affection becomes largely diffused in the pelvic and lumbar regions, by the side of the aorta especially, they form large tumours, encroaching on the diaphragm, and inducing difficulty of breathing in some instances, and in others, by pressure on the great veins, leading to effusions into the cavity of the peritoneum and to anasarca of the lower extremities, and the secondary growths often become widely generalised in the other organs of the abdomen.

The fact of secondary enlargement of the glands in sarcoma of the testis is contrary to the general law laid down in many text-books, viz. that sarcoma does not produce affection of the lymphatic glands. If this law be true of sarcoma generally, with regard to the testis the law is reversed; those in which the secondary affection does not occur, are generally of extremely short duration, perhaps die before sufficient time has elapsed for the affection of the glands to be developed.

The spermatic cord becomes thickened, and in rare instances, because of the strong fibrous coverings that resist the outgrowth of the disease, the skin of the scrotum gives way and a fungous tumour presents itself.

In the end death takes place by exhaustion, induced either by the rapid generalisation of the internal disease or by the effects of the bleedings and discharges that arise from the fungous tumour.

The testicle becomes the seat of occasional pains of a vague character. It assumes an ovoid lengthened shape with a contour tuberosa, and may

contain cysts or cartilage, skin non-adherent, its consistence generally elastic, or firm in some places and elastic in others, and with this increase in size a sense of dragging and weight at the cord. The pains are at first slight, but after a time, dependent mainly on the weight of the tumour, they are of a lancinating character. As the disease advances severe dull pains extend along the cord, in the groins and inner side of the thigh, and, finally, in the iliac and lumbar regions.

Cystic disease of the testicle, in the cases I have seen, has not afforded any signs whereby it could be distinguished from sarcoma arrived at that stage when one would recommend castration as the only remedy. But, as cystic disease requires for itself the same treatment, its discrimination from sarcoma is unimportant, whilst the appearance of the tumour on section will readily enable the operator to predict for his patient that certain immunity from recurrence which attends the removal of this form of benign growth.

In all cases of contemplated excision of the testicle the tumour should be punctured previously.

The only remedy applicable in cases of cancer or sarcomatous tumours of the testicle is castration. This should be adopted in the earliest possible stage before the general health has become affected; the operation is not attended with any danger, nor, as a rule, do any complications arise to retard the ordinary rapid recovery of the patient's health.

The operation should not be recommended when the lumbar glands are involved, or when there is any suspicion of secondary disease having commenced elsewhere.

Nevertheless, I am induced strongly to urge patients not to delay submitting to this proceeding where the symptoms leave no doubt as to the true nature of the disease. The subsequent immunity from the redevelopment of the disease may be brief or otherwise, and hitherto experience points out that the chances are in favour of comparatively speedy recurrence, but I am satisfied that the patient will endure less suffering from having lost the local disease by operation than he will encounter in the probable advent of a sloughing fungus added to the formations of secondary growths internally, which in either case ultimately destroy life.

## CHAPTER XXI

### ON SARCOMA OF THE CRANIUM

SARCOMATOUS tumours, apparently growing from the surface of the cranium, may have their origin either from any portion of the bone itself or from the membranes or substance of the brain. When they arise within the skull they gradually perforate the bones, and make their way outwards, and in many cases it is with great difficulty that they can be distinguished from those that spring from the bones. After a time the skin covering them gives way, and a spongy bleeding fungous mass protrudes, which grows rapidly, and soon terminates in death of the patient. In their earlier stages these tumours are of small dimensions and immovable, and they are usually free from pain for a considerable period. When they originate within the skull they have generally a distinct pulsation; the orifice in the bone through which they have protruded is not always to be distinguished, owing to the bulging of the growth over its margins. Their origin is very frequently at the seat of some blow or injury.

The bones of the skull are subject to all three forms of sarcoma in about equal ratios, glandular affection generally absent, presenting not one but many flattened tumours of the inner or outer table



of the vault growing as if simultaneously from both aspects of the bone, so that it is rare to find a tumour of even moderate bulk upon the outer that has not its companion, if not so large, upon the inner surface, caused no doubt by penetration of the bone, either from the inner or outer side, confined without by the tight drawn pericranium and within by the dura mater; these membranes are not easily infiltrated by the disease, but the bone yields readily before the new growth of cells; its surface is eroded, its diploë or cancellous tissue filled with new material. Death from pressure on the brain is rare, while the greater part, at least, of tumours of the skull cause death within a year or a little more, some of them are marked by a much slower growth and longer course. It must be borne in mind that sarcomatous tumours of the cranium, which originate from the bones of the skull, or from the interior of its cavity when perforation has taken place, are of very rapid growth, and that they are usually accompanied by some symptoms indicating in an unmistakable manner that the brain or some of the nerves issuing from the cavity of the skull are subjected to some unusual pressure; hence we have headache, impairment of memory, partial loss of sensation or motion, vomiting, &c. These symptoms sometimes occur even when the disease has originated from the bones external to the cranial cavity. Another point of great importance when these growths originate within the skull, and perforation has taken place, is the fact that they frequently pulsate synchronously with the respiratory movements. This sign is of extreme value when it exists, and will be sufficient to distinguish

these tumours from any other kind, but great care must be taken not to confound it with a pulsation which may be met with in vascular tumours of any kind, and which is synchronous with the cardiac systole.

## CHAPTER XXII

### ON SARCOMA OF THE CAVITY OF THE NOSE

MALIGNANT polypus frequently arises in the nasal passages. It is true sarcoma. At first the patient is sensible merely of an obstruction in one nostril, sometimes attended by an ichorous and sometimes by a bloody discharge; before the polypus has made a certain progress it will be difficult to determine its nature; there is little difficulty subsequently.

It appears as a soft, spongy, livid substance of rapid growth, which speedily takes possession of one or both nostrils. In its further extension the nasal bones are separated, the soft palate is pushed downwards, lateral prolongations take place into the maxillary sinus, and its final course is made manifest by protrusions on the cheeks and upliftings of the orbits.

Attendant on these conditions the voice becomes muffled, the smell lost, respiration and deglutition are impeded, and even sight and hearing are impaired; the adjacent lymphatics very often and very early enlarge. Malignant nasal polypi in their extreme growth penetrate into and distort adjacent cavities and parts. And sarcoma having had its development within the cranium, resembling polypus, may appear in the nose by perforating the ethmoidal bone; the extension of

the nasal disease to the sinus is comparatively infrequent, its course being inclined rather towards the pharynx and to widening of the nasal bones; in these cases the neighbouring glands very rapidly take on a malignant action, and prevent the chance of any surgical interference. Death takes place either by suffocation or exhaustion.

Where the pressure on the pharynx is very marked in the early stages, and before exhaustion has set in, the operation of tracheotomy would give a better prospect of prolonging life, and would diminish the dangers that might attend any subsequent efforts made to clear away the disease from the posterior nares.

## CHAPTER XXIII

### ON SARCOMA OF THE UPPER JAW

SARCOMA of the superior maxillary bone is of very frequent occurrence. The patient is sensible of a dull, or sometimes lancinating, aching pain in the jaw, frequently associated with decay in the teeth, and with a spongy, bleeding state of the gums. A tumour may present itself on the alveolar margin in the places of the fallen teeth, or it may appear in the palatine arch, in the nasal passages, on the cheek below the orbit, or in the zygomatic fossæ. Externally the veins become apparent, distended, and tortuous, and the lymphatic glands may or may not enlarge. As the disease advances the sense of smell becomes affected, and if it has pushed its way to the orbit vision may be impaired, whilst copious and fetid discharges frequently interfere with the function of taste.

Complete extirpation of the bones with which the disease is connected is, in every case, the only remedy applicable in the upper maxilla. This proceeding cannot be regarded as promising other than palliative relief, but the difficulties of diagnosis in the early stages of the tumours found in this region, and the fact that a similarity of treatment is necessary for all, will lead one in a great number of instances to recommend the patient to submit to the chances of an operation. The earlier, however, that this is done the greater will be the chance of



subsequent immunity from return. So long as the disease is mainly confined to the cavity of the antrum it can be completely extirpated, but where the neighbouring glands are enlarged, where infiltrations have extended to the pterygoid or the ethmoidal cells, and their entire removal becomes impossible by the knife and unpromising by any other means, operative interference ought not to be recommended.

Having regard, however, to the rapidity with which patients almost always recover from the most serious operations on the face, and especially to the fact that death rarely ever immediately follows as a result of this operation, there are few, if any, cases, if the patient desires it, in which the surgeon may not undertake it with the view of prolonging life.

In all these operations it is well to tear away the tumour and its attachments at the final stage, thus avoiding the use of the knife in the situation most likely to give rise to hæmorrhage, and any bleeding vessels that cannot be secured by ligatures or other ordinary means should have the actual cautery applied to their mouths; the risk of dangerous hæmorrhage in this operation seems to be much less serious than would at first sight appear. I have no doubt that this immunity is due to the great tearing and pulling at the last stages of the operation in place of using the knife. The extension of the disease backwards towards the pterygoid processes, the existence of which can hardly be ascertained before the removal of the disease is being effected, will certainly endanger the trunk of the internal maxillary artery, even when the utmost caution is observed during the operation.

## CHAPTER XXIV

### ON SARCOMA OF THE LOWER JAW

SARCOMA of the lower maxilla does not present the same difficulties of diagnosis as those which are met with in the upper. It ordinarily arises from the decaying socket of one of the teeth, very frequently from the body of the jaw itself; and sometimes it commences in the soft parts, and extends itself to the bone. When it commences in the socket of a decayed tooth it presents itself as a soft, spongy, bleeding fungus. It is the seat of pains of varying intensity and character. At first its growth is slow, but afterwards it rapidly involves surrounding parts, the adjacent glands enlarge, and the tumour spreading, ulceration sets in and destroys the patient by repeated hæmorrhages and discharges.

In the body of the bone it appears as a tumour between the plates, enlarging the part unevenly, expanding the walls, and sometimes absorbing them, and attaining, in many instances, a considerable size before breaking outwardly by ulceration. Occasionally these expansions of the walls contain within them cysts filled with serous or glairy fluid. Less frequently the gum and periosteum give rise to small spongy growths, which at first resemble epulis, but which involve the bone and assume all the characters of sarcoma in their subsequent career.

Excision of the entire portion of the bone with which the tumour is connected, and very frequently of the corresponding articulation, is the only remedy applicable to cancer in the lower jaw. To secure the lengthened immunity from return of the disease the removal must be free and complete, and in those cases where it is situated near the angle so as to encroach on the ramus, disarticulation should in all cases be performed. The disease, in the cases of excisions of portions of the body, has invariably returned in that portion of the divided jaw nearest to the articulation; seldom or never does it return in that portion nearest to the symphysis.

My practice is to disarticulate at the first operation rather than leave the angle or ramus for the return of the disease to seize hold of.

The history of these patients subsequent to the operation strengthens the belief that sarcoma is less rapid in its progress in the lower jaw than it is in the upper, and that there is a less speedy tendency to softening and infiltration. Hence the more completely the local disease is removed in this situation the greater probability will there be of a curative action resulting.

Excision of any portion or the whole of the lower jaw may be carried into effect without division of the lip or angle of the mouth. By this means the escape from the deformity of visible scars will be most complete.

Where the symphysis of the jaw is involved in the disease so that the muscles attached to it are necessarily divided, the precaution of passing a whip-cord ligature through the tongue, to prevent the possibility of its falling back and inducing suffo-

cation, should never be omitted. This provision is only of a temporary nature, and may be safely dispensed with on the readjustment of parts and completion of dressings. It is marvellous how little real disfigurements attend these operations on the jaws.

## CHAPTER XXV

### ON SARCOMA CONTIGUOUS TO BONE

SARCOMA frequently presents itself in the form of a primary tumour, having its situation in the inter-muscular spaces of the trunk and extremities, originating external to the periosteum, in the cellular tissue between it, and the deeper muscles by which it is covered.

The places of selection in which these tumours appear are about the lower end of the femur and upper end of the tibia. They are not uncommon at the upper part of the thigh and about the pelvis. In the upper extremity we encounter them chiefly about the shoulder and scapula.

Their appearance is often attributed to a blow or some other injury, and in many cases, perhaps the majority, they arise without any known cause, and are met with at any age.

The patient at first discovers a small swelling placed deeply in one of the situations referred to.

In shape it is irregular, though mostly rounded, more or less movable, firm and elastic, and generally unattended by pain. As the swelling increases its outlines become obscure. It pushes its way in between the muscles and along the bones, altering their form and limiting their functions. In the case of a joint, like the knee, the swelling not infrequently fills in the popliteal space, arresting



the power to flex the leg; and, by interfering with the blood-vessels, gives rise to venous engorgements and œdema around and below the seat of disease. Notwithstanding this increase, the tumour can still be made out as not growing from the bone or periosteum, an indistinct mobility, on firm handling, will decide the origin.

The pain, with the advance of the disease, may become severe, but this will depend mainly on the character of the parts by which the growth is surrounded and the amount of motion to which they are subjected. As a rule, the amount of pain experienced when the tumour is small is not complained of.

At length the general health of the patient suffers, secondary infiltration of the glands takes place, and the growth itself speedily enters on its last stage. In the earlier, and even in the later, stages of these tumours they constantly convey the most deceptive sense of fluctuation to the touch; the absence of fluid in them can only be determined with certainty by an exploratory puncture.

The integuments for a long time remain unchanged until the growths from beneath uplift them in irregular lobes. They then become thin and livid in colour, and numerous veins appear beneath them or in their vicinity. Finally, they give way at one or more points, and fungous protrusions, hæmorrhages, and sloughings occur. Until the sloughing stage of these tumours is established the surrounding soft parts are rather stretched, absorbed, and pushed on one side, than occupied by deposits of the growth. In like manner the adjacent bone is not infiltrated. The periosteum is, however, eroded,

and its compact walls become thinned and absorbed. In the case of growths encircling the long bones pressure alone effects changes that render them liable to fracture on the slightest injury.

### SARCOMA OF BONE OR OSTEOID SARCOMA

Osteoid sarcoma, ossifying or chondrifying sarcoma. All primary malignant tumours of bone must be regarded as sarcoma, for no epithelial elements exist in bone. The hard parts, the cancellous tissue, medulla, nerves, blood-vessels, and lymphatics, even the endothelial lining of vessels, belong to the connective-tissue series. The tumours which grow from bone must therefore be connective tissue tumours, not carcinomas, and the presence of an alveolar structure, if decidedly impressed, can only serve to inspire a doubt if such a tumour be really primary.

They are capable of division by an easy and natural method: those of central and those of superficial or subperiosteal origin; for although the latter are more probably of periosteal than of osseous origin, the term "subperiosteal" will serve to distinguish them from tumours growing from the outer surface of the periosteum.

The soft tumours are grouped according to the form of their cells, so are all primary malignant tumours of bone and may all be arranged under three heads: round-celled, spindle-celled, and mixed-celled sarcoma. The round-celled and spindle-celled require no further definition than that which applies to such tumours wherever they occur. The

first consists of vast numbers of round cells, generally of equal or nearly equal size, and bearing similar characters, embedded in a homogeneous or granular basis substance, often fibrillated or distinctly fibrous, or may be calcified or chrondrified, or even ossified in parts; with these are associated the finely reticulated tumours whose structures resemble that of a lymphatic gland, which have on that account received the name of "lympho-sarcoma" or "lymphadenoma," a name to which their structure perhaps entitles them, even when their relations to adenoid or lymphatic tissue cannot be proved.

In the second group all the other conditions may be those prevailing in the first, but the type of cell is altered. It is now no longer round or oval, but is narrow and elongated, namely, spindle-cells, fibre-like, or oat-shaped, or look like grains of wheat.

In the third group there remain many tumours which, by reason of the various forms and characters of their cells, can neither be included among the round- nor spindle-celled sarcoma. Not only in different sections of the same tumour, but in different areas of the same section, or even in the different parts of the same field of the microscope, may be discerned round, oval, elongated, spindle, and stellate cells, or the soft parts of the tumour may be found of round and spindle or of oval and stellate cells.

The presence of bone, or lime salts, or cartilage does not render the tumour mixed-celled.

Then the simple sarcomata of bone are classed according to the form of their cells, and as little difficulty is experienced in assigning to each its

place, so may the more complex tumours which contain bone, or earthy salts, or cartilage, be classed according to the form of the cells which compose their softer parts. It is by the transformation of these softer parts that bone and cartilage are formed, and by the increase of these softer parts the increase of the mass takes place. If particles of bone, or lime, or cartilage are scattered through the tumour, no modification of its name seems needful. But if a large proportion of these materials should occur so that the characters of the tumour are materially altered by them, this alteration may be expressed by some appropriate term preceding that which applies to tumour, on account of the form of its cells. For example, a tumour which consists partly of dense hard substance, partly of soft succulent material, is a calcifying spindle-celled sarcoma, for the succulent material is formed of spindle cells, and the hard substance is impregnated with earthy salts, but there are no lacunæ or canaliculi. Again, a tumour which presents to the eye characters almost identical is an ossifying mixed-celled sarcoma, for the material is formed of mixed cells, and the hard substance has a structure of the rough bone common in such tumours. A nomenclature such as this is sufficiently simple and easy of application.

It is clearly important to distinguish between the denser forms of these ossifying sarcomata and the simple osseous growths which they sometimes closely simulate; for the simple osseous tumours are probably never malignant, whilst the presence of any admixture of a soft fleshy substance having the microscopic characters of sarcoma is of grave prognostic significance, and, although by no means for-



bidding operation, necessitates the utmost care to ensure the complete removal of the tumour.

As in some cases the medullary canal of the bone is sometimes found to contain nodules of the disease at some distance from the neighbourhood of the large tumours, it would seem to be a sound rule to resect the affected bone entire rather than to trust to sawing across it at an apparently safe distance from the morbid swelling. Even a careful resection of the entire bone will not, however, always ensure the permanent removal of the disease, for I have seen a case of ossifying sarcomatous tumour spread over the head and thorax following removal of the leg, which I performed through the knee-joint for a similar tumour of the tibia.

In subperiosteal sarcoma the round-celled predominate in the ratio of forty per cent.; the spindle-celled thirty-two per cent; and the mixed-celled twenty-eight per cent.

### SARCOMA OF THE LONG BONES

Sarcoma presents itself in a long bone essentially in the form of an infiltration of its structure; it is very constantly a primary disease, being deposited in the midst of the osseous tissue, whether compact or spongy. It mostly occurs between the ages of eighteen and thirty, more rarely after forty. Its favourite localities have been the middle and lower portions, and next to this the diaphysis of the femur; and the upper end or upper third of the tibia, next the head and shaft of the humerus, following in the remaining long bones without preference.



In those of central origin, firstly, the structures of the bone invaded by the disease are gradually merged in the accidental tissue which takes their place and finally disappear altogether; or delicate bony processes, remains of the old bone, or a new formation springing from the periosteum, permeate the tumour in all directions, forming a kind of network for the support of the soft succulent material. It is this form that one finds chiefly in the shafts of bones, and which, by its extension along the medullary canal, renders the limitations of its ravages to any one part of the affected bone impossible.

Secondly, the bone becomes expanded as a thin shell, giving way before the growth of the tumour little by little until it forms only a mere skeleton on its outside. The articular extremities of the bones are more generally the seats of this mode of development, the shafts above being less certainly invaded by the disease than in the first-described variety. Whether the primary cancer originates in the compact tissue of any given bone is a question difficult to determine in practice, and one that has no bearing on the treatment. The tendency of such a growth in its increase would still rather be towards the medullary canal than towards the periosteum, and were this not so it would be as difficult to say where the compact tissue ceased to be affected, as I have stated it to be in reference to the spongy. From the foregoing description of a difference in the mode of growth of sarcoma arising internally in bone or those of "central origin," no features dissimilar as to malignancy can be drawn. It is not so, however, in regard to those of "superficial" or "subperiosteal" origin. Here, covered by the periosteum, the

growth is applied rather than otherwise connected with the outer surface of the bone. Vertical and oblique plates "osseous stalactites" arrange themselves more or less compactly in the shape of a tumour, which may completely surround the part or affect only one side. Between these laminæ of bone, deposits of soft material take place, filling in the intervals between them, constituting the soft portions of the swelling, and being easily separable by maceration. In the deeper parts of this kind of tumour the bone is often condensed and ivory-like, the compact wall itself also becomes so, and prolongations of the same dense material may be observed in the contiguous medullary canal, but the interior of the bone seems otherwise unchanged. These essentially differ from the infiltrating sarcoma in the extent of their malignancy, for the whole of the bone is not affected by their presence, and their return after amputation is more remote and uncertain. On the other hand, in their recurrence, or if left to themselves, they give rise to the same train of events that ends in breaking down of the constitution.

In some instances the sarcomatous growth is accompanied by the presence of one or more cysts, filled by a serous or gelatinous fluid, sometimes bloody, and at other times of various colours. A favourite locality for this complication is the popliteal space of the thigh, where the cyst is superadded to the primary deposit in the structure of the condyles. When these cysts are large they may very much embarrass the diagnosis, as they often mask, from their rapid growth and great size, the original disease.

*Symptoms.*—These are at first vague and ill defined; very frequently, after a slight injury, such as a fall or a blow, acute but inconstant pain are experienced in the part. These pains are explained away as neuralgic or rheumatic, and it is not until a distinct enlargement becomes evident that any mode of inquiry can guide to the true nature of the impending malady. The character of the pains will vary according as the disease may be placed, closely confined and surrounded, or admitting of free expansion in its growth. In the one case, by rapid progress, they speedily assume the nature of those peculiar to deep seated tumours. They become intense, sometimes dull aching and continuous; at others, occurring at irregular intervals and giving a sensation of sharp cutting instruments running through the swelling. In the other, the origin and even the progress of the malady may be wholly without pain. In its very early stage it forms a mere projection on the surface of the bone. In all cases it is immovable, and generally deep seated. It is unaltered by compression, and without pain on handling, except where the affected bone is thinly covered. The integuments over the tumour are for a long time unchanged; muscles and aponeurotic layers move freely over its surface, retaining their texture and functions.

The sarcomatous tumour in bone may increase rapidly or slowly, usually it develops itself alarmingly fast. Its outer volume, however, may be no real guide to a knowledge of the extent of its ravages, as it may spread along the medullary canal and fill in the wide spaces of the epiphyses of bone for a considerable time before it breaks through and changes the soft parts.

When the compact wall of the bone has yielded, the tumour, now covered by periosteum, pushes its way amongst the muscles towards the surface; after a time the periosteum gives way, and then the muscles, and with them all other soft textures save cartilage undergo absorption and infiltration as the tumour advances; finally, the growth becomes more and more prominent in outline, and subcutaneous.

In some instances, and especially in the soft rounded sarcoma of bone, when the tumour comes within reach of the surface, there is present the same marvellous sense of semi-fluctuation already alluded to. The ordinary shape presented by these tumours is rounded and irregular, usually smooth, and they often attain a great size before the skin covering them bursts. If the base of one of these growths be grasped firmly by the hands, it conveys a remarkable sensation of fixedness and solidity, in this respect contrasting with the tumours that have their origin near the bones.

As the disease matures the general health becomes affected; with the successive changes in the parts the neighbouring glands enlarge, the pains often become intolerable, and the patient succumbs to the effects of exhaustion produced by bleeding and sloughing or by the effects of secondary deposits in the lungs, liver, or other parts of the body.

The escape of cartilage from implications in sarcomatous infiltrations of the articular extremities of the long bones is truly remarkable. The whole epiphysis is often destroyed by the advance of the disease, whilst the investing cartilages of the joint are unaffected; the cartilages may be partly eroded and thinned by the effects of pressure of a growing



tumour, but otherwise they are unaltered. Notwithstanding this immunity, a soft, quick-growing tumour, such as we are describing, will from time to time penetrate the interior of a joint and give rise to collections of blood and other changes due solely to the mechanical inconvenience which its presence occasions. This is generally effected by a lateral escape of the cells growing from within the epiphysis; the wall of bone having disappeared, as well as the periosteum, the adjacent synovial membrane offers the least resistance to its further progress; it at length yields, and the growth intrudes itself within the joint, overlying the incrusting cartilage.

*Treatment.*—The only treatment applicable to these malignant tumours of bones is amputation or disarticulation. Either the one or the other of these means of removing the disease should be resorted to in the earliest possible stage, before either the glands or the constitution have become in any way affected by its presence. Local applications are worse than useless in these cases, and serve only to diminish the chances of the patient's immunity from recurrence of the malady in the future. As a rule, disarticulation should be preferred on the principle that whenever amputation through a bone in which the disease originated is performed the patient is exposed to the liability of the disease having been prolonged in the medullary canal above the point of section. This rule of invariable amputation at the contiguous joint, or through the shaft of the bone immediately above, must naturally be modified under certain circumstances, more especially where the operation in itself, as in the case of removal of the



whole lower extremity at the hip, is eminently dangerous to life. But where this consideration is not before the surgeon there ought to be no hesitation as to the line of treatment he should recommend. Reserving, therefore, the consideration of disarticulation at the hip, the remainder of the subject admits of clear decision. Thus, whenever the disease originates in any part of the tibia or fibula, amputation should be performed through the knee-joint or through the thigh. When in the radius or ulna, at the elbow-joint or through the humerus. When in the humerus at the shoulder-joint.

Where the situation of the disease in the shaft of the femur, as in the upper third, admits of no alternative, then amputation at the hip should be advised, as affording the patient the only means of treatment. Lower down, in the middle third, the operator may amputate through the trochanter and dissect out the head of the bone in preference to the more dangerous wounding of vessels involved when the flaps are cut at the hip. When, however, the disease is in the lower third of the bone or in the condyles, there will be many reasons to induce the operator to amputate through the shaft of the femur high up rather than disarticulate. The foremost of these will ever be the gravity of amputation at the hip, under any circumstances a gravity rendered more conspicuous in the face of the well-known want of power to bear operations which patients suffering under malignant disease of bone so constantly exhibit.

Further, that although the liability for the sarcoma to recur at the sawn extremity of the bones is very great it must also be borne in mind that it by no

means always does so, any more, indeed, than that recovery after amputation at the hip establishes any certainty that the patient will escape secondary deposits in the internal organs rather than one who has also recovered from amputation through the continuity of a limb.

As to the prospects of recovery which operations in these cases afford, no opinion should be given with confidence. Left to themselves destruction of limb and loss of life are inevitable. On the other hand, if the disease is found out and appreciated early and is followed by amputation its recurrence may be postponed altogether. With the knowledge of this fact before us, then, we are warranted in urging patients to give themselves the chance that attends an operation when the general circumstances of the case justify its performance.

#### A. *Subperiosteal or superficial origin.*

The femur is by far the most frequently affected by subperiosteal sarcoma, the round-, spindle-, and mixed-celled varieties in about equal proportions, and run a rapid and fatal course, although operation be early practised, secondary deposits are early found in the lungs, affection of the glands occur so rarely, but possibly this may be accounted for by the pulmonary disease being the first to cause the fatal end, ulceration of the integument over the tumour is mostly absent; they occur most frequently between the ages of twelve and thirty, usually promoted by a squeeze or blow. The seat of election of sarcoma of the femur in preference is the

lower end of the bone, next to this the diaphysis is the most frequent position. The duration of the disease is from nine to twelve or fourteen months, some cases have gone so far as three years.

Tumours of the tibia are represented by all three varieties; in no important respect do the three varieties differ, save in the prevalence of ossification or calcification in the mixed-cell forms, but in some respects they differ widely from tumours of the femur. The growth is often more slow, the tumour not infrequently breaks through the skin and fungates; the ulcer thus formed establishes a drain, relieving the pressure within the tumour, diminishing the tendency to the projection of cells or fluids into the vascular or lymphatic system, thus averting for a time the disease from more vital parts; secondary deposits occur in the lungs. The seat of election of sarcoma of the tibia in preference is the upper end or upper third, although in the following case it occupied the middle third of the tibia, and the secondary growths were most extensive over the entire trunk and head.

Charles Heed, æt. 19, admitted under my care November 22nd, 1876, for ossifying sarcoma of the right tibia. The patient has noticed the tumour for eight months, caused by a blow on the skin by falling over a bucket, which now occupies the middle third of the tibia, projecting anteriorly; ulceration occurred some two months previous, from which he suffered several hæmorrhages, now presenting a huge mass, about the size of his own head, with the development of numerous highly vascular fungous protuberances. A profuse discharge flows from the ulcerated spots in the dis-

tended integument, an enlarged gland in the groin. He is extremely emaciated and anæmic; no family or hereditary history of cancer.

November 28th.—Since admission the growth has rapidly increased; I amputated the limb at the knee-joint. The further recovery was uninterrupted, and February 12th, 1877, he had entirely regained his natural strength; discharged March 3rd.

On cutting through the tumour it was found to spring from both tibia and fibula; from the tibia an osseous skeleton projected into the body of the tumour, filled up with soft material; this was divided by fine fibrous tissue into lobes; the more vascular parts consisted almost entirely of congregated blood; the soft material was made up of mixed cells; numerous spindle cells.

C. H—, readmitted 25th June, 1877, now presenting a most remarkable appearance, body and face wasted, head greatly enlarged, quite hydrocephalic, with three elevated masses or nodules separated from each other by deep furrows, consisting of a firm even enlargement of the bones beneath; the scalp covering this is but little altered.

The left eyeball protruded, being forced outwards and downwards, and double its normal size, sclerotic, immensely vascular, and shiny; iris irregular, no sight. Lips heavy and corrugated, quite double their normal state, highly vascular. The stump is free from return of the disease, but secondary growths are felt along the sides of the the spine in the lumbar region. The patient lay screaming in his bed with agony, and his appearance was miserable in the extreme; the growths of the head both outside and within increased,



and on October 8th death released him from his sufferings.

Dissection revealed most extensive enlargements of secondary lobulated tumours on both sides of the spine in its entire extent; secondary deposits in the lungs, liver, and brain; no recurrence in the amputated limb.

Like the tibia, the fibula is most often affected at the upper end or upper third; generalisation of the secondary growths occur with great rapidity.

Tumours of the humerus are exceedingly malignant, as may be inferred from the rapidity and manner of their growth, and mostly select the head or the shaft of the bone; generally no enlargement of the glands takes place; secondary growths found in the lungs.

#### B. *Central origin.*

Most of the central tumours of bone may be included in one or other of the three groups, namely, the round-celled, spindle-celled, and mixed-celled, but to these must be added those comprising the myeloid or giant-celled sarcomas. For the description of the giant cell I must refer to page 158, under the subdivision myeloid sarcoma; they may form as much as four fifths of a central tumour, but never comprise its whole bulk, for with them are always mingled round or more often spindle cells, yet a tumour of central origin may contain no giant cells, but may be formed solely of round or spindle cells; the giant cells are not of equal occurrence in the tumours of all bones, but exhibit a marked predilection for certain bones, the



lower jaw, the femur, and the tibia above all others, and even for certain parts of these bones, as the lower extremity of the femur and upper extremity of the tibia; as before stated the typical colour and appearance of a myeloid tumour are due to the presence in it of a large number of giant cells, giving it the maroon or dark red, or a fleshy colour.

Most of the following features are common to both central and subperiosteal growths.

Central tumours occur in persons older than those who are the subjects of subperiosteal tumours, and are by no means rare in persons advanced in years; and central tumours grow for the most part more slowly than those which originate beneath the periosteum; injury is not credited with the production of a large proportion of the tumours of bone. A tumour of either origin may pulsate, but the symptom is more common in the central than in the subperiosteal tumours; where the cause of pulsation can be ascertained it is due to an abundant supply of vessels of moderate calibre.

Long bones, short bones, and flat bones are liable to sarcoma, but not all bones equally, or even all the bones of each shape in equal proportion. The long bones of the lower extremity are far more frequently attacked than the bones of the arm and forearm. The flat bones of the skull, the scapula, and the innominate bones, are all subject to sarcoma, but the skull bones most of all.

None of the short bones are very liable to the growth of the primary disease. In the long bones they show a decided preference for the epiphyses or articular ends, and, especially the tumours of central origin, for one articular end of each bone. In the

upper extremity it is the upper epiphysis of the humerus, the lower of the radius and ulna; in the lower extremity the lower epiphysis of the femur, the upper of the tibia and fibula. What explanation can we give for these selections? All these parts contain cancellous tissue in greater or less abundance; their position renders them liable to squeezes, blows, and injuries of various kinds; in the process of development of the bones they are the parts which are the first to ossify, the last to be united with the shaft, and the direction of the nutrient artery is from them, not towards them.

Speaking generally, it may be said that central sarcomas are far less malignant than subperiosteal, and tumours of the bone more distant from the trunk than those of bones more near.

The least degree of malignancy is infiltration of contiguous structures, much more common in superiosteal than in central tumours, and, though generally seen in tumours which become generalised in distant parts, not a necessary precursor of this more marked malignancy; infiltration of the lymphatic glands rarely occurs in conjunction with subperiosteal, still more rarely with central tumours. Yet when glands having no lymphatic relation with the region primarily diseased become sarcomatous, the affection is no doubt conveyed through the medium of the blood.

The last degree of malignancy is that in which growths appear in organs or tissues more or less remote from the part in which the tumour first was noticed, in most cases undoubtedly conveyed there by the blood, as when the interior of the heart or lungs become affected.

Of all organs, the lungs are far more commonly affected than any other, and the tumours which exhibit the most marked tendency to widespread generalisation are the round-celled varieties, and which are largely influenced by the situation of the growth.

For all tumours of central growth occurring in the bones of the extremities, the chances afforded by amputation appear to be infinitely greater than for subperiosteal tumours. And for those of the leg, forearm, or even of the arm, when the tumour has not extended beyond the limits of the bone or periosteum, for amputation resection may be substituted. For central tumours of the lower jaw and clavicle, resection or enucleation may be practised with the best hopes of success.

## CHAPTER XXVI

### ON GLIOMA

#### SARCOMA OF NERVE

GLIOMA (*γλία*, glue), so named by Virchow, is the special tumour of nerve closely allied to the small round-cell sarcoma. This growth proceeds from the neuroglia or delicate connective tissue, which supports the nervous elements of the brain and its extensions, and more frequently comes under the observation of the ophthalmic surgeon. It may occur in the brain, and so give rise to the special symptoms of brain tumour, according to its position ; but it is more usually encountered springing from the retina of a child, for glioma is almost wholly limited to early life, the intra-ocular tumours met with in later years being generally sarcoma, or rarely carcinoma. The child is brought to the surgeon blind, and with, perhaps, already a peculiar yellow metallic brilliancy of the pupil. Ophthalmoscopic examination reveals a whitish mass bulging into the vitreous and interfering more or less considerably with the normal position of the lens and other parts of the eye. If now the eyeball be removed, as it should be without delay, a section through the globe will probably bring to light a pinkish-white brain-like mass, with opaque yellow spots through it,

springing from some portion of the retina, projecting forwards into the vitreous, and involving to a greater or less extent the other tunics of the eye.

After hardening this structure in suitable reagents, thin sections can be made, and it is then seen that the mass is made up of closely aggregated, very small corpuscles, round, oval, or tending in parts to a spindle form. These corpuscles are granular, with one or two bright central dots, and are embedded in a soft amorphous or obscurely fibrillated stroma. The stroma is usually so soft and scanty as to be with difficulty discerned, but about the edge of a very thin section it may happen (Fig. 15) that some of the corpuscles may be displaced,

FIG. 15.

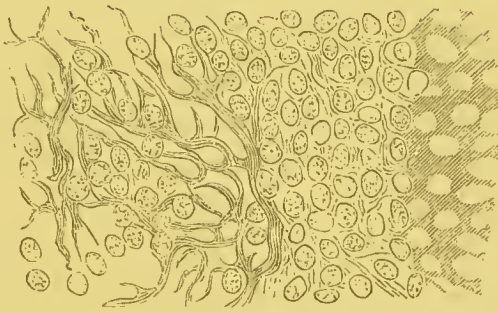


FIG. 15.—Very thin section of a glioma sarcoma of the retina.  
Magnified 220 times.

and the connecting substance is then more clearly visible. In other cases the stroma is distinctly fibrillated, and this fibrous element seems particularly developed in the secondary gliomatous growths. The corpuscles are mostly the size of leucocytes, or smaller, and, save for their delicacy and position, have little to distinguish them from the elements of round-cell sarcoma. In certain cases, indeed, the



cells may assume a much larger form, and, passing into spindle shapes, be wholly undistinguishable from the sarcoma elements furnished by the coarser forms of connective tissue. The yellow opaque spots are cheesy masses, the result of the fatty degeneration of the new tissue which has, doubtless, often led this growth to be called tubercle of the eye. Growing commonly as a single nodule in the retina, multiple growths in the same tunic have been met with, and loosened tumour cells from a detached retina may alight upon the choroid and give rise to fresh growths in that structure. In the later stages of the disease the growth freely involves the tissues with which it comes in contact, and finally projects from the orbit as a bleeding, fungating, unsightly mass, infiltrating the parts around and causing hideous deformity of the face. The history of these examples of malignancy warns the surgeon not to delay an operation which may be completely successful in the eradication of the disease, if performed in time.

Occurring in the brain, glioma assumes the form of a soft, roundish tumour, of grey semi-translucent material, not unlike infiltrated tubercle, but softer, more vascular, and larger than most tubercular masses, and with less tendency to extensive cheesy metamorphosis. Microscopically the structure of the brain tumours corresponds in all respects with those developed in the retina.

Although rarely encountered as a secondary growth in the abdominal or thoracic cavities, cases are recorded of secondary glioma of the liver, of the kidneys, and instances of extension to the brain and of infection of the neighbouring lymphatic

glands and of the bones of the face have been noticed.

The following case is the history of a recurrent glioma :

Jessie Hill, æt. 5, admitted to the Cancer Hospital October 9th, 1877, suffering from glioma of the right orbit. Operation October 31st; relief for a time, but disease again reappeared; left hospital November 29th, 1877.

On the 4th of last August this child had her eye removed for some deep-seated disease. At that time it is stated the eye was much swollen and protruded, health had always been good before, and no injury was received by the eye; at present, a huge growth protrudes from the socket of the eye, it stands out about four inches and is as large as a good-sized orange; it has burst through its coverings and its edges everted. The child reduced to a very low state, and rapidly losing flesh; constant sickness of stomach prevents its retaining any nourishment. The brain seems clear and unaffected; no infection of the neighbouring lymphatic glands or of the bones of the face.

As a means of relieving the child's condition and comfort, I removed the tumour by means of the galvanic wire *écraseur*, and then burnt away the mass with the actual cautery down to the bottom of the orbit, and applied chloride of zinc paste to the interior of the entire orbit. For four weeks the operation was followed by great relief of all symptoms; the child's appetite and spirits returned; but, alas! the tumour reappeared soon after this and again grew with wonderful rapidity, with somewhat the same appearance as before, projecting from the

orbit as a bleeding, fungating, unsightly mass, now infiltrating the parts around and causing hideous deformity of the face ; nothing further could be done, so the child was taken home by its mother to await there its death.

The practice of dividing the optic nerve close to the foramen, and of applying chloride of zinc paste to the interior of the orbit, lest some remains of infectious material light up fresh mischief, must commend itself to all operators. This precaution is specially desirable in those not infrequent cases in which the optic nerve, divided at first close to the globe, is found swollen, with a creamy fluid oozing from its cut surface.

From this sketch of the tumour no doubt exists that glioma exhibits features of malignancy just as we see sarcoma to do ; and there are not wanting records of cases which sufficiently justify the position of glioma amongst the cancers, in their clinical sense.

## CHAPTER XXVII

### MELANOTIC SARCOMA

It was stated, when treating of carcinoma, that by far the greater number of pigmented tumours are really sarcomas of either the round- or spindle-cell variety. Whether the cells are round or oval, the striking fact about these growths is that the pigment granules are contained in only a very small minority of the cells, although the tumours may be as black as ink. And it is further noted that although the rule is that all the secondary growths are also black, the amount of pigmentation may vary considerably, and some of the visceral masses may be quite pale—still, however, presenting the same cell forms as the primary tumour. No organ is exempt from the liability to become the seat of these melanotic growths.

As a primary disease its most frequent seat is the subcutaneous connective tissue, the skin; the muscular tissue of the heart may occasionally be infiltrated with nodules of the disease; it has been observed also in its first form in the lower jaw, in the testicle, vagina, and rectum, and it is said likewise to have been seen in the liver.

The appearances presented in the skin is by the production of a small, solitary, deep brown, black, or blackish spot, situated on some part of the skin.

Very frequently this spot is located near to a congenital mole or wart, or the congenital marks themselves undergo melanotic degeneration.

The disease may remain quiescent for a considerable period, but sooner or later an increase in its dimensions becomes evident, and the neighbouring glands are contaminated, or its progress may be manifested by the development of numerous secondary deposits of the same black colour in the cellular tissue of the body, or in the viscera. When a cutaneous wart degenerates, the first indication of a change in its character is perhaps evidenced by the discovering of black streaks running across its free surface, or darkening the margins of the growth, as it rests on the part to which it is attached. These changes are singularly devoid of pain, and indeed, effect no apparent alteration in the hitherto harmless growth beyond that which the eye detects in the colour.

In the eye, the globe becomes distended by the morbid growth, which first locates itself between the choroid and the retina. In the first instance a dark livid colour is presented, and after a time, when the tunics have become absorbed or ruptured by pressure, a fungous mass of the characteristic sooty blackness pushes its way outwards, followed by the discharge of black fluids, and by the breaking off of masses of the protruding fungus; the neighbouring glands rarely become affected, but secondary deposits may be found of considerable size scattered through the brain, and may abound in the subcutaneous cellular tissue. Unlike the development of cutaneous deposits, the growth of that of the eye is from first to last accompanied by severe pain, owing to the



unyielding nature of the parts, and not to any difference between the characteristics of the disease in the skin and the eye; in rare instances the subcutaneous tissue is the locality where melanotic sarcoma first displays itself; it will here appear as an isolated spherical nodule, the black or the bluish-black colour of which is visible beneath the skin. These solitary nodules may be very numerous, or only a single one may be detected; they may vary in size from a pea to a hazel nut, they are movable in the early stages of their growth, and by degrees the skin covering them becomes adherent, and at length yields by gradual absorption, and the black nodule starts outwardly, loses its spherical character, becomes flattened, and finally ulcerates and discharges a peculiar secretion devoid of smell. The subcutaneous tissue or cellular membrane is, however, as above-mentioned, very frequently the seat of the secondary growths of this disease.

As a secondary growth in the substance of an organ it presents itself in the shape of nodules, either partially encysted or altogether devoid of any trace of such a covering. These nodules vary in size from that of the smallest granules to that of a considerable tumour. In colour these are generally intensely black, but sometimes they are composed of a mixture of the round-celled sarcoma with the melanotic, which gives them a variegated appearance. In the cellular membrane, around internal organs, the disease assumes the characters described as belonging to the primary melanotic deposit of the subcutaneous cellular membrane.

The surfaces of organs appear, as it were, streaked with the deposit running in lines of varying thick-

ness, and always abruptly defined from the adjacent natural colour of the part. At other times it appears as if sprinkled in spots, or laid on in a thin layer; in these instances the colour is always black.

It is found in a liquid state; some of the nodules are sometimes partially fluid in their interiors. This condition is owing to the softening and breaking up of their contents, and not to the deposit of the melanotic matter in a fluid form; in consistence it is like that of black paste.

When the liver is diseased by secondary growths it is enormously increased in size, the nodules are rarely single, the whole of the liver being generally studded with them of all sizes, and are visible in the midst of the natural liver structure in all directions, perfectly isolated, and most frequently without any appearance whatever of being contained in a cyst. In colour, the masses vary from the deepest black to shades of a less intense colour; sometimes they assume a brownish tint. The nodules that are near the surface elevate the peritoneal coat so as to be visible through it, constituting an irregular nodulated aspect throughout.

The muscular tissue of the heart itself may occasionally be infiltrated with nodules of the disease, and I have before mentioned that black masses of considerable size may be found scattered through the brain.

Melanotic sarcoma will doubtless attack persons of all ages; but there can be no question that it is a disease of adult, middle-aged, and even advanced life, rather than childhood, and that it exhibits no predilection for either sex.

Scirrhus carcinoma, comparatively rarely, becomes associated with melanosis, but the sarcomas are constantly encountered in connection with it, presenting every possible degree of admixture.

The cut aspect of a tumour of melanotic sarcoma presents the consistence and the appearance, except as to colour, of a round-celled, soft sarcoma; and even this exception to the complete resemblance is only partial, as portions of the same tumour frequently display an absolute similarity in all respects.

Examined by the microscope, melanotic sarcoma is found to present the same characteristic cells, namely, the round or oval, or spindle cells of the three forms of sarcoma, with this difference, that granules of black pigment are found within the cells or interspersed amongst the other elements of the growth. In other respects, in dimensions, in infiltration, in rapidity of growth, in attacking almost any part, and at any age, and, in a word, in maintaining pre-eminently the cancerous features of destructiveness and incurability, the melanotic closely pursues the same course as the sarcomatous tumour.

The great clinical indication in all examples of melanosis is to cut out the primary tumour as speedily and as widely as possible, as the early and free dispersion of the germs soon renders the extirpation of the disease impracticable.

## CHAPTER XXVIII

### C. LYMPHADENOMA—LYMPHOMA

It is only of recent years that special attention has been called to this disease, and now recognised by the name lymphadenoma or lymphoma, to signify the close correspondence between the microscopic structure of this growth and that of the follicular portion of a lymphatic gland (the adenoid tissue of Professor His), known also as Hodgkin's disease. Trousseau designated it "Adénie."

The disease may shortly be described as one in which soft infiltrating tumours of various sizes are scattered through the several organs and tissues of the body in a manner precisely resembling many of the soft sarcomas and carcinomas, but made up of very different and sufficiently characteristic elements.

The morbid structure, usually commencing in an enlargement of lymphatic glands, and often limited to such hypertrophy, is often met with invading the internal viscera, as the spleen, lungs, liver, and kidney; the muscles and bones are not always exempt from the disease.

Many lymphatic glands being matted together form one vast mass, the tumours are usually of a greyish or yellow white colour, sometimes as distinctly encapsuled as a lymphatic gland, but in other cases passing gradually into the structure of the



part in which they are seated, varying in size from a miliary granule to that of an ostrich's egg or larger, and in consistence from a creamy pulp to that of a cirrlosed liver, and yielding a more or less abundant milky juice. Microscopically examined, this juice is almost sufficiently diagnostic, for it contains none of the cell-forms already described as occurring in carcinoma or the commoner varieties of sarcoma, but only small, spherical, faintly granular

FIG. 16.

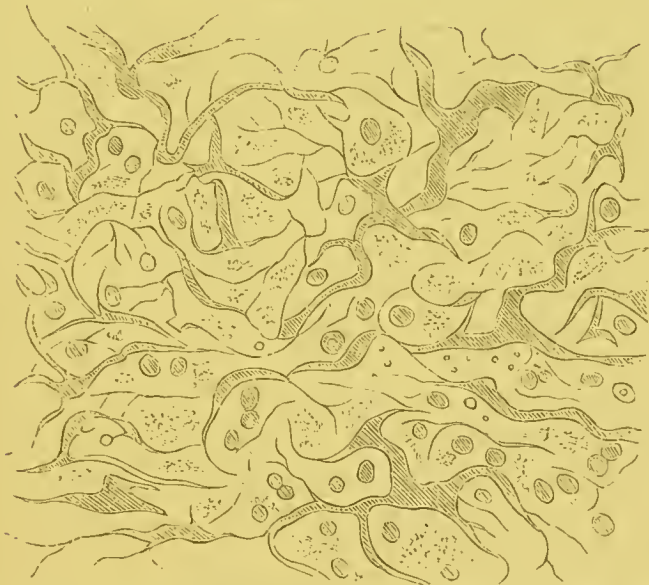


FIG. 16.—Lymphadenoma or lymphoma. A very thin section, pencilled out under water, showing the delicate irregular network and a few remaining corpuscles. Magnified 220 times.

corpuscles, precisely resembling leucocytes, or the white corpuscles of the blood, with these there may be free granules and a few somewhat larger distinctly nucleated cells.

It is, however, only when thin sections are taken from bits of the tumour hardened in chromic acid



solution that the true structure is seen. Sections thus prepared show a fine homogeneous-looking network, enclosing in its meshes, either singly or in small clusters, the pale spherical corpuscles seen in the juice. In the early stages nuclei are to be distinguished in certain of the angles of this network just as in the stroma of a lymphatic gland; but in the later stages, those generally seen, the network is formed of stouter fibrils, in which the nuclei are less apparent. The structure then closely resembles that of a lymphatic gland in a condition of irritative induration, and it is this structure, with the fibrillated stroma more or less largely developed, that forms the bulk of these tumours. To see this stroma distinctly it is necessary to pencil out a very thin section under water. When the corpuscles which obscure the view have been thus mostly chased away, the irregular network is clearly visible, although the absence of nuclei from the angles of the meshes takes away the most characteristic element and that which specially distinguishes this growth from the small round-celled sarcoma. The sarcoma, however, is so seldom accompanied by any notable fibrillation of its stroma, that a distinct small meshed network is of itself sufficient to stamp the lymphadenomatous character of the growth presenting it. Whether these lymphoid formations originate in the proliferation of ordinary connective tissue, or whether they consist of hyperplasia of pre-existing adenoid tissue, is a question difficult to decide. In all their clinical features of rapid infiltrating growth and implication of adjacent glands, as well as the formation of similar swellings in remote parts, they are probably as malignant as

the most virulent carcinoma, and need the same treatment. The tumours differ from the similar masses present in leukæmia only in the absence of any obvious alteration in the blood. The histological structure is the same in both cases, but there is no notable excess of white corpuscles in the blood of a patient with lymphadenoma as there is in so marked a degree in leukæmia.

The following case, reported in the 'Lancet' of September 4th, 1880, shows the virulency with which lymphadenoma is sometimes met with.

Patrick D. B—, aged 26, a collier. In August, 1879, he met with an accident in the coal-mine, being injured between two tubs and thrown on his back across the tram-rails; he was off work for a month; he was then seen December 10th. On examining his abdomen, in the left iliac region was found a round, hard swelling about the size of a large orange; the tumour was immovable, and seemed to increase in size at its base. The inguinal glands and femoral glands of both sides were hard and enlarged, but not painful. He complained of pain behind the abdominal tumour in his back, and attributed all his symptoms to the accident. The pasty, puffy appearance of his face increased, his left leg and thigh became œdematous, bed sores commenced to form over his hip and great trochanter, and the femoral glands enlarged. His breathing got more impeded and debility much greater.

On January 7th, 1880, the glands just above the clavicle on the left side were much enlarged and almost in one mass, and the posterior triangle of the neck also contained glands enlarged in size. He gradually got worse and died on January 18th.

20th.—Post-mortem examination was made. The body was emaciated, with swellings of large glands in the neck, inguinal regions, and left side of abdomen, œdema of the left leg. Head and chest examined.

. . . Abdomen, liver, spleen, kidneys, stomach, and intestines healthy. . . . On pulling over the small intestines and mesentery, there was found lying on the left side of the bodies of the two lower lumbar vertebræ a solid mass, firmly adherent, about the size of two kidneys, and was outside, but enveloped by, the peritoneum. A number of enlarged glands were found on the under surface of the mesentery, about the size of buttons, and these passed down chain-like into the pelvis along the rectum, being larger on the left side. The glands in the femoral canal were also enlarged.

A. von Winiwarter, in a recent work, has drawn a well-defined distinction between the malignant, rapidly growing lymphomata and the primary medullary sarcomata of lymph glands (lympho-sarcoma). The former generally commence in several glands of one organ, especially the neck, remain movable for a long time, become confluent, however, at last; after a while other groups of glands become affected, and finally, similar tumours occur in internal organs. Two varieties can be distinguished—a softer, on section greyish red, and a firmer, fibrous, on section a whiter kind; the latter is more rapid in its course; both forms of malignant lymphoma always terminate fatally. Lympho-sarcomata are either round-celled or spindle-celled; they occur chiefly in glands; the surrounding tissues are gradually attached to the peripheral portions of the tumour, and thus little by little they become

immovable; secondary deposits in the lungs and spleen take place. I consider these differences as perfectly correct in general, and founded on careful observation; but I venture to think that combinations of the two forms not infrequently occur together.

*Treatment.*—The treatment of these lymphatic diseases will at first be a constitutional one; cod-liver oil and salt-water baths are useful, and, unless the constitution of the patient contraindicates it, iodides. If the anæmia is very marked iron may be given, either alone or in combination with iodine.

In some rare cases recently formed lymphatic swellings may resolve. In some cases large, quickly growing (malignantly soft) lymphomata on the two sides of the neck, in both axillæ, and in the inguinal regions, have disappeared almost entirely in about eight weeks. Unfortunately, however, the number of curable cases of this disease is very small; and exactly in those cases which have gone too far for operation, and where, therefore, internal remedies would be of such great value, do these medicines generally leave us quite at fault.

Indeed, I have several times recognised the injurious effects of too energetic iodine treatment on rapidly growing tumours of this kind, especially the sudden onset of softening in the greater part of the tumours, accompanied with symptoms of violent fever. Lücke has had successful results from the parenchymatous injection of tincture of iodine into these tumours. I have seen small abscesses and slight atrophic shrinking follow this treatment, but no regular progressive wasting of them. A similar



result has attended the action of the constant current. N. Czerny has made use of parenchymatous injections of Fowler's solution, injecting daily one to three drops. Of external remedies iodine is the most efficacious, mercury the least so. Successful results have been obtained from compression by means of special instruments constructed for each particular case, however not reliable.

A cure from surgical operation can only be looked for in those cases where the disease has run its course in the glands we remove, but we are often compelled, on account of pressure on the trachea or for other reasons, to remove glands which are in an active stage of growth; in such cases we must be prepared either for a local recurrence or for disease in neighbouring glands. A careful consideration of the individual circumstances of each case must decide whether an operation is at all likely to be of service or otherwise. The effects of the operation in cases where the glands are not yet adherent, and with an unbroken capsule, are borne remarkably well. When, however, the glands have fused into a single mass of tumour growth and are very soft, then not only is this a sign of rapid growth and that there will be almost certain recurrence, but one may also anticipate that the operation will in consequence be very much more difficult to carry out. There are medullary lymphomata occurring in young and, for the most part, otherwise healthy men, which spring from the deeper parts of the neck, then grow backwards behind the angle of the jaw and into the fauces, and finally affect both the tonsils and the pharynx; as a rule, death takes place early. In these cases, operations, though



possible, are dangerous, but do not prolong life very much. Of the remaining glands, which, according to the most recent researches, belong to the lymphatic system, the tonsils are the only ones which are subject to hyperplastic disease; but this hypertrophy, so common in children and young persons, belongs rather to the chronic inflammatory variety of lymphatic swelling; it results most often from chronic catarrh of the pharynx, though the contrary is usually, but wrongly, considered to be the case; that is, the hypertrophied tonsils are regarded as the cause of the pharyngeal catarrh; hence extirpation of them in such cases is of no avail so far as concerns the primary disease—frequent attacks of sore throat. Hypertrophies of the thymus also occur, but they are exceedingly rare.

Lymphoma occurs also in tissues which do not belong to the lymphatics. I include under lymphoma all those soft medullary tumours in which, after careful hardening and microscopic preparation, a reticulum analogous to that in lymphatic glands can be demonstrated. In this sense I have seen lymphomata in the upper jaw, in the scapula, in the cellular tissue, in the eye, &c., tumours which, in their structure, are with difficulty separated from granulation sarcoma, especially from Virchow's glio-sarcoma, and which, on account of their peculiar look, pass as "medullary."

According to my own experience, this mixing up of the above-named varieties entails no serious prognostic error, as both sorts appear to be equally malignant and equally infectious; nevertheless, the importance of a detailed examination of these tumours is not the less obvious or to be underrated.

What we now class in the group of "lymphoma" was formerly included partly in the hyperplasia of glands, partly in the sarcomata, and partly under "medullary tumours."

## CHAPTER XXIX

### D. EPITHELIOMA

EPITHELIOMA is a new growth furnished by the proliferation of the epidermis, or by the epithelium of the mucous membranes, although sometimes in its later stages thoroughly malignant, affecting chain after chain of lymphatic glands, and cropping up luxuriantly in remote viscera, as the heart and lungs, is yet a growth far more under surgical control than any of those which we have been considering.

Epithelioma has almost always been separated somewhat from the true cancers, and by some, who have refused to place it in the same category at all, by others, who merely regarded it as a variety of carcinoma, affirming a close analogy of minute structure in the two growths, and pointing to the difference of origin of their cells—glandular or surface epithelia—as constituting the sole claim to separation into distinct varieties.

Although epithelioma and carcinoma are made up of epithelial cells and stroma, and in certain points are closely analogous, nevertheless I cannot help believing that we are right in keeping them distinctly apart, for both in coarse, physical appearances, and in minute structure epithelioma, as we

shall see, differs from carcinoma just as widely as it differs from it in the far more important features of clinical history and symptoms.

An epithelioma of the cutaneous surface, occurring usually as a shallow, hard ulcer with thick fungous edges, presents a favorable specimen for exhibiting the characteristic microscopic structure of the growth, as well as its mode of origin and of invasion of the neighbouring parts. On examining a thin section from the margin of such an ulcer, although here, as in carcinoma, we have before us clumps of epithelial cells in an irregular alveolated stroma, yet the cells now differ hardly at all—save, perhaps, in their size and active nuclear proliferation—from the normal epidermis cells from which they have descended. They vary in size from  $\frac{1}{300}$ th to  $\frac{1}{1000}$ th of an inch in diameter; they contain usually a single nucleus, frequently, however, the nuclei are multiple. We lack here the rich variety of cell-forms which supplant the small, regular gland epithelium in carcinoma of the mamma, for instance, and at the same time we notice how comparatively slight are the fatty changes occurring in the misplaced epidermis scales. They dry up, shrivel, become squeezed by circumferential pressure into curious onion-like masses, met with wherever excessive epidermis growth is in progress, but in singular and characteristic abundance in epithelioma, or they become distended with colloid material; but they seldom undergo much oily degeneration, save where inflammatory or ulcerative changes are actively at work. The cells further show a tendency to cohere by their margins, as do normal epidermal cells, and dove-tailing together by finely serrated edges, after

the fashion of the upper cells of the healthy rete mucosum. In fact, the new growth seems to consist simply of masses of surface epithelium, which, instead of appearing above and between the papillæ, dip down amongst the connective tissue, and there actively multiplying and thriving as much from the unwonted supply of fluid nourishment as from the absence of the desiccating process to which they are normally subjected as they are pushed on towards the surface of the body, form large tubular and branching collections, capable of more prolific development the further they are removed from the surface, and at the same time more freely subjected to the risk of single cells being taken up and hurried away in the lymph- or blood-streams to form similar collections elsewhere.

This seems to be, indeed, what really happens in the formation of a primary epithelioma. Why this invasion of the subcutaneous tissues by epithelial elements takes place in certain cases, when all the physical conditions favorable to its production must be frequently present in any wart or condylomata, it is not easy to say; but there is nothing in the process, so far as we can observe it, to justify us in assuming a special condition of blood as its determining cause, whilst the dispersion of the disease throughout the body, rarely considerable in its extent, seldom involving more than the nearest chain of lymphatic glands, and always presenting the same epidermis-like scales wherever the secondary growth springs up, is thoroughly and solely suggestive of transference of cells of the primary tumour and their multiplication in their new seats.

Thus, the one essential anatomical feature of



epithelioma is the presence of proliferating epidermal cells in abnormal situations. So long as the change is limited to an excessive development of surface epithelium, with, it may be, considerable enlargement of the papillæ, the growth is a papilloma; or if the proliferation commence in a sebaceous gland, so long as the result is a mere accumulation of gland

FIG. 17.

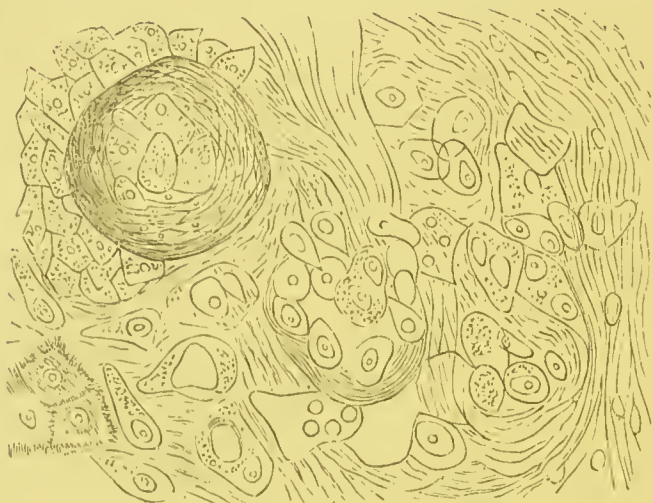


FIG. 17.—Elements from an epithelioma, showing the large squamous cells, many with multiplying or double nuclei, and with a tendency to the formation of “bird-nest-bodies,” cells containing colloid matter, and some serrated cells. A fragment of fibre forming the stroma. An epithelial pearl (bird’s nest, *globes épidermiques*), showing the production of these bodies by the multiplication and subsequent flattening of squamous cells. Magnified 220 times.

epithelium within the gland walls, this may go on to almost any extent, and be accompanied by secondary fatty changes, but the only issue will be a more or less inconvenient “atheromatous cyst,” both purely innocent formations. But once let the

boundary be broken through, and the cells penetrate the deeper tissues, and lymphatic infection may take place at any time, in all probability with a rapidity in proportion to the movement and moisture of the affected part; and with such infection the growth passes at once from amongst the innocent tumours to the cancers (Fig. 17).

Whilst the cells of an epithelioma, therefore, differ in a marked degree from those of carcinoma, and by reason of their tendency to mutual cohesion are not nearly so liable to be carried off to distant regions, the stroma is equally to be distinguished from that of carcinoma. The stroma is derived from the inter-fibrillar connective tissue. We have nothing like so regular an alveolar fibroid stroma as supports the cells of a carcinoma, although the increased connective-tissue growth, with probably an undue vascular supply, occupies in epithelioma an analogous position to that structure.

The coarse characters of epithelioma, the thick, mushroom-like elevations, the indurated excavations, the slow but destructive march, and the scanty, perhaps fetid discharge, as well as the common site, an old wart, scar, or edge of an ulcer, or, in healthy parts, specially the line of junction of skin and mucous membrane, as the lip or vulva, renders the diagnosis of the disease generally easy.

The epitheliomatous tumour itself is firm in consistence, often more or less friable, and on section presents a greyish-white, granular surface, sometimes intersected with lines of fibrous tissue. The cut surface yields on pressure a small quantity of turbid liquid, and in many cases also a peculiar, thick, crumbling, curdy material can be expressed,

which often comes out in a worm-like shape, like the sebaceous matter from the glands of the skin. This latter is very characteristic. It is composed of epithelial scales, and on being mixed with water it does not diffuse itself like the juice of other cancers, but separates into minute visible particles. If it is very abundant, the epithelioma is soft and friable, and the material can be seen in the cut surface as small, scattered opaque dots.

Epithelioma has its primary seat in the immediate vicinity of the cutaneous or mucous surfaces, the point of junction of the two being its favourite situation. It appears in most cases to owe its origin to some external source of irritation. It is rare in the young, and is most frequently met with in the lower lip at the junction of the skin and mucous membrane, on the tongue, prepuce, scrotum, labia, eyelids, cheeks, and the uterus and bladder. As it extends it may involve any tissue—muscle, bone, and tendon may be alike implicated, affecting the lymphatic glands, but very rarely occurs in the internal organs.

*Cylindrical epithelioma.*—This term is applied to those forms of epithelioma which grow from mucous membranes with columnar (cylindrical) epithelium, as from those of the stomach and intestines. In these tumours the epithelial elements are similar to those of the mucous membrane from which they grow. They are cylindrical in shape, and are arranged perpendicular to the walls of the alveoli in a manner precisely analogous to that of the columnar epithelium on the mucous surface. There is rarely a formation of concentric globes, and the growths are of a soft and often gelatinous consistence. These

tumours cause secondary growths in the lymphatic glands, and sometimes in the liver and lungs, which possess the same characters as the primary epithelioma. The distinction between them and simple adenomata is often exceedingly difficult.

## CHAPTER XXX

### EPITHELIOMA OF THE LIP

EPITHELIOMA is of frequent occurrence in the lip, more often seen in the lower than the upper, and almost confined to men. Essentially it is a disease of the latter half of life, and most commonly met with between forty and fifty. Of the influence of external causes in producing the disease little can be said with certainty. Cases present themselves from time to time in which it has followed an external injury; others where it resulted from repeated wounds in the same place with a razor; whilst a very general belief exists that of all predisposing causes none has so strong a claim to prominence as the long-continued use of the short clay pipe. I must say that none of these causes in themselves are calculated to produce epithelioma of the lip in a person not predisposed to the disease; certainly, amongst the vast number of people who smoke there are not found more cases than are to be found generally amongst any given number of the population.

A far greater source of mischief arises from the tendency of patients to scratch and pick away any little scab, fissure, or sore on the lip. Moreover, the situation of the annoyance exposes it to the edges of the teeth, as well as the ceaseless move-



ments of the tongue. By these means irritation is kept up, and that which might be healed as a simple sore remains to fix itself more deeply and widely by slow ulceration.

The earliest appearance of the disease is often in the shape of a little button-like tubercle, situated near the junction of the mucous membrane and the skin, most frequently on that part of the lip that lies between its centre and the commissure of the mouth; sometimes a mere sore forms, and sometimes a little crack or fissure.

Under any of these modes of attack there is always more or less induration present. As time goes on a thin discharge scabs over the surface; repeated removals of this lead only to the production of inflammation, both in and around its seat; gradually the sore widens and deepens, its edges becoming elevated and clearly defined; in some instances, without deepening, the sore is entirely prominent, its centre being filled in with granulations on a level with the edges. In the early stage of this disease there cannot be said to be pain—a sense of itching and inconvenience alone being present.

Epithelioma of the lip, left to itself, affects the neighbouring glands, those in direct anatomical relation, the submaxillary, are very frequently found enlarged and hardened when the primitive disease is very small. Little by little the process of ulceration extends—skin, muscle, mucous membrane, bone, are each in turn destroyed, and other glands about the invaded parts undergo a similar change. The health of the patient, usually remarkably good, becomes worn down by continual discharge, whilst

severe lancinating pains occasion much suffering. The destruction of the parts around the mouth interferes with mastication, the saliva dribbles away, and hæmorrhages not unfrequently assist to hasten the fatal termination. In other respects the organs of the patient are unaffected, and no developments of secondary growth are found at a distance from the original seat of the disease.

When epithelioma of the lip has advanced to its ulcerative stage it may be mistaken either for rodent ulcer or for indurated chancre.

“ Rodent ulcer is not often met with in the lips, and when it does attack them it is almost without an exception the upper lip that is affected by it. Rodent ulcer is not a malignant disease, it never affects the neighbouring glands; its progress is very slow but sure, and it involves all the surrounding tissues, and even the bone itself in its destructive course; the ulcer is generally very irregularly excavated, being much deeper in some parts than in others, and one of its most distinctive characters is that the surface of the ulcer is smooth, presenting no outgrowths nor any of the sprouting, vascular, and rapidly-growing granulations which are so common to the true epithelioma; its margins are hard and often tuberculated, but neither undermined nor everted; and one of the most certain and most characteristic points of difference between this ulcer and the malignant ones is that the progress of the ulcerative action is never accompanied by a coincident deposit in the tissues surrounding the ulcers. There is very little discharge from the surface of these ulcers, and what discharge there is is seldom either of a purulent or sanguineous nature,

on the contrary, it is rather a thin dirty ichor. The pain in rodent ulcer is very much less than it is in epithelioma.

With regard to indurated chancres of the lips it must be admitted that it is impossible to distinguish them under certain circumstances by their mere appearance from an epitheliomatous ulcer, but their history, especially the rapidity of their formation after the first appearance of any disease in the part, the almost coincident induration of the glands—moreover, not the nearest glands, as in the case of epithelioma, but generally the post-cervical—and the rapid development of the constitutional symptoms of syphilis, will in all cases enable one to distinguish this disease from epithelioma before any operation for its removal need be performed; but if any doubt shall remain it may be solved by observing the effects of specific treatment for syphilis.

Epithelioma of the lip may be removed by the knife, or may be destroyed by the action of caustic; internal remedies are of no assistance, and any other external ones are equally valueless. I have the strongest conviction that caustic has itself proved one of the greatest sources of irritation in many cases where its incomplete application sufficed only to provoke inflammation.

When, therefore, we consider the uncertainty of diagnosis which belongs to this disease, in the period where interference is most desirable, and that the treatment by complete excision may, in many cases, effect a cure whether the case be one of cancrroid or epithelioma, we are at a loss to account for the number of cases that present themselves in a hopeless state, attained not less by the apathy of the

patient than by the indifference of the surgeon to an early interference.

In making use of the **V** incision the surgeon should bear in mind the great importance that belongs to his carrying the knife wide of the disease. This circumstance is apt to be lost sight of, as the incision on either side, widely apart at first, approximates closer and closer to its fellow as it nears the apex.

Another method is by including the disease in a semilunar incision at a single sweep of the knife, commencing and terminating at a sufficient distance beyond the seat and passing freely below it, so as to have its concavity directed upwards; the wound thus made is left to fill in by granulations.

Either of these methods will suffice to remove the disease completely; and so pliant are the parts about the mouth that the disfigurement resulting from the loss of substance is of the most trivial character.

The first method is, perhaps, more applicable to cases where the disease extends on to the integuments of the chin, than to those where it is confined to the lip itself.

Where it is determined to use caustic it should be applied promptly and freely; if any hardness extends beyond the sore the epidermis must be removed from it, so as to include it completely in the range of the caustic. The best caustic, perhaps, is the chloride of zinc. To relieve the pain, so agonising in the vast majority of cases, no remedy will avail so much as extreme cold, whether derived from the evaporation of ether or the admixture of ice and salt.



Where the ulceration has extended to the chin an autoplasmic operation may afford great relief to the patient; so elastic are the parts about that very great losses of the soft textures, and even of the bones themselves, can be sustained with comparative impunity.

No fixed plan of proceeding can, however, be laid down, each case will have to be treated as it presents itself, on the special extent and relations of its ulcerating activity; in all instances the object to be accomplished is the same, namely, to completely remove the disease, and to cover in the gap with sound parts taken from the surrounding spaces. This operation must always be regarded as palliative, and though the extent of diseased surface may hardly prove a barrier to its being undertaken, the existence of enlarged glands in the vicinity should ever determine the surgeon against its performance.

After removal by operation, where the disease recurs, the tendency is for it to appear again in the same seat or very near to it; where it recurs in the cicatrix, and the proceeding is practicable, it should, without delay, be again excised as extensively as possible; very often, however, the cicatrix remains sound, whilst the disease manifests itself in the adjacent soft parts of neck and face or in the lower maxilla.



## CHAPTER XXXI

### EPITHELIOMA OF THE TONGUE

EPITHELIOMA of the tongue is unhappily the disease which most frequently claims our attention in connection with this important member of the body. It commences in one of two different ways, either as a small, hard, irregularly-shaped tumour, or as a mere sore, boil, or excrescence; it usually shows itself beneath the free surface of the upper or under aspects or at the edges, but it rarely occupies at first the entire thickness of the part. The tendency to ulceration is marked and rapid, and the edges of the sore become hardened, elevated, and irregular; for a long time the ulceration is confined to one side or the tip, and very slowly and in very rare instances does it ever extend across the raphe, yet a condition called ichthyosis almost always, that is, if the tumour is of any size, extends across and to some distance into the opposite side, that this morbid state is the immediate precursor, indeed, the first stage of epithelioma. At first there is little pain or inconvenience; as the disease advances there is difficulty in swallowing and a sense of weight in the organ, whilst afterwards severe lancinating pains occur periodically. The greatest distress arises further on from accumulations of saliva and mucus

and fetid discharges. Food can only be imperfectly taken, and the act of deglutition assumes a condition of the most painful character. With the spread of the disease the glands in immediate relation with the affected part become enlarged, and not unfrequently infiltrations extend themselves on the sides of the pharynx. Where the seat of the disease is far back on the dorsum or implicates by extension the pillars of the fauces an incessant spitting is often observed, together with irritable cough.

The general health, at the onset and for a considerable time remarkably good, suffers in many cases afterwards, more from the impossibility of taking food than from the spread of the disease. The patient becomes eminently cachectic, and worn down by fetid exhalations, in the very centre of the most necessary enjoyments of life, he succumbs from exhaustion, from starvation, and sometimes from hæmorrhage.

Of the cause of epithelioma of the tongue it is impossible to speak with any degree of certainty; carious and ragged teeth are accused of determining the commencement; and I cannot, myself, recollect having seen an instance of the disease in the presence of a completely sound set of teeth; to this may be added the degeneration of intractable ulcers originating from syphilis.

It belongs mostly to the middle period of life, between thirty-five and fifty, and though by no means common in extreme old age, it is rarely met with under thirty years, and is as frequent among women as among men.

Epithelioma of the tongue may be mistaken either

for chronic ulcer of the tongue or for syphilitic disease. Chronic ulcers of the tongue frequently bear a very great resemblance to epithelioma in its earlier stages, but they do not spread with anything like the rapidity of epithelioma, and never destroy so much of the substance of the tongue; they are attended with comparatively little pain, and there is

FIG. 18.

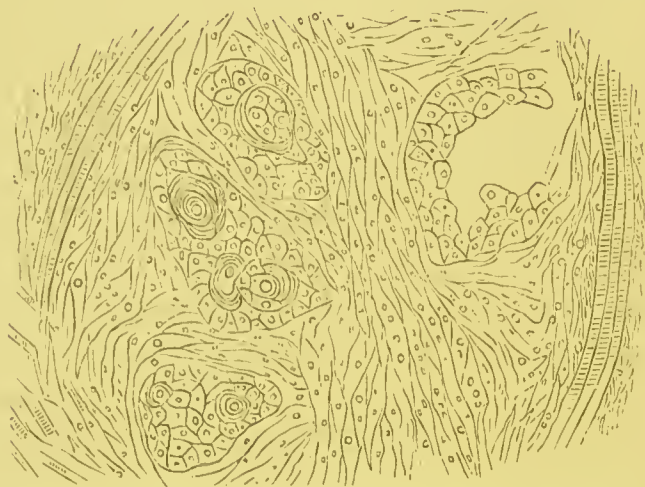


FIG. 18.—Section through an epithelioma of the tongue, showing clusters of squamous epithelium containing some "onion-like masses," or the *globes épidermiques*, and surrounded by the normal connective tissue of the part, being a fibro-corpuseular growth; showing striped muscular fibres at the edges. Magnified about 40 times.

but little induration of the edges of the ulcer, moreover the lymphatic glands seldom become affected, and when they do so it is but to a very slight extent, the glands being swollen and tender, but they remain distinct, and never form a large tumour as they do in secondary growth of epithelioma.

When the ulcer is of syphilitic origin we have, in addition to the characters just mentioned as dis-

tinctive of chronic ulcers, the history of previous syphilitic disease or the actual presence of some well known symptoms of it, such as sore throat, cutaneous eruptions, loss of hair, &c. When any glandular affections are present it will nearly always be found that they have preceded or accompanied the disease of the tongue; no reliance can be placed on the situation of these ulcers, although probably the majority of syphilitic ulcers are situated on the surface. If the case is a doubtful one resort should be had to an anti-venereal course of treatment, which will speedily cure the disease if it be of syphilitic origin, whilst it will have no effect, or rather none but an injurious one, on the epitheliomatous ulceration.

To sum these points up, the characteristic marks of an epitheliomatous ulcer of the tongue are the great hardness and extensive induration of the edges of the ulcer, the rapid progress it makes, the great destruction of the substance of the tongue, the very severe pain, and, lastly, the very extensive affection of the glands, generally on the side affected, though frequently on both sides, and which increase with great rapidity, and often form a very large and painful tumour.

There are no remedies with which we are at present acquainted that exercise any influence in retarding the progress of the disease. The powers of life must then be sustained on the same principles as those which guide us in our treatment of all exhausting disorders. All sources of irritation should at once be withdrawn; and with this view any decayed teeth should be taken away and the surfaces of the apparently sound ones examined in



order to smooth down any sharp cutting edges. The application of caustics of all degrees, save the actual cautery, will only serve to excite inflammation.

Great comfort will, however, be derived by the judicious use of gargles; the character of these will depend in great measure on the nature and extent of the discharges, whether fetid, sanguineous, or otherwise; where bleeding takes place after the ordinary astringent means, the *Liquor Ferri Perchloridi*, applied on lint, will very often prove effectual, and, lastly, in the failure of this and ice, the actual cautery should be applied without hesitation.

Our only means of arresting the progress of epithelioma of the tongue consists in resorting to an operation. This, to be of service, cannot be done too early; when the neighbouring glands are affected in a decided degree, or when the parts in the floor of the mouth are likewise implicated, no operation should be advised. A mere enlargement of the neighbouring glands in the presence of unchanged general health should not prevent interference, as the enlargement may be due to merely sympathetic irritation, which may subside on removal of the cause. Under the best aspects the treatment of epithelioma of the tongue by operation can only be looked on as a palliative measure, the tendency after all operative interference, however well considered, being to a speedy relapse. Portions or the whole of the tongue may be removed by the use of the knife or ligature. The *écraseur* may take the place of the knife in effecting this object, dependent on the position and extent of the disease in particular cases.



The method of performing this operation is of some importance, and here I may be pardoned if I quote a paper of mine as a reprint from the 'Lancet' of July 5th, 1879, and headed "Clinical Remarks on the Painless and Bloodless Method of Excising the Whole Tongue."

My remarks are suggested by reading a most interesting lecture, reported in the 'Lancet' of April 18th last, headed "Clinical Remarks on a Painless Method of Excising the Whole Tongue," by Mr Richard Barwell, F.R.C.S., of Charing Cross Hospital, in which he follows to a degree Nunneley's method, but ingeniously deviates into a path of his own, and by which he argues that he performs a painless method of excising the whole tongue.

After one or two observations which Mr Barwell's paper suggests, I will describe the operation for the same object as performed by myself and colleagues. I quite agree with Mr Barwell, and recognise the the full force of what Mr Fairlie Clarke pointed out some years ago, that if epithelioma of the tongue, ulcerated or not, exist on one side only, yet a condition called ichthyosis almost always, that is, if the tumour is of any size, extends across and to some distance into the opposite side; that this morbid state is the immediate precursor, indeed the first stage of epithelioma; hence the reason that to take away a part of the tongue and leave behind an ichthyotic portion would be a grave mistake. I am sure it will be conceded that removal of the tongue, wholly or in part, for cancer is a justifiable and wise surgical proceeding, and that the sooner the operation is performed after diagnosis of the disease has been made the greater are the prospects of a long

immunity from the disease, or even of a complete cure, for there are few if any local cancers that are the cause of more local distress if left alone, and there are few operations for cancer that give greater comfort than those on the tongue; therefore it behoves us to seek for the least painful, most manageable, and most effective plan, as also the least bloodless.

I must take exception to Mr Barwell's remark, however, when he comes to call his operation "a painless method."

The lingual-gustatory nerves get divided when his patient is under the influence of the anæsthetic, and therefore insensible to pain, and get divided in the same place by whatever method is employed when the whole tongue has to be removed. But Mr Barwell throws out a suggestion that when a less portion of the tongue has to be removed the lingual-gustatory nerve of one or both sides might with advantage be divided on the ramus of the jaw.

The division of the sensory nerves of the tongue was first proposed by Hilton, who practised section of the gustatory branch of the fifth nerve with a view of relieving the pain of a cancerous ulcer, and enabling the surgeon to apply ligatures for the removal of the cancer to a part that has been deprived of all sensibility. Moore also adopted it, and it undoubtedly accomplishes the object for which Hilton originally proposed and practised it, more especially so far as the relief of pain and diminution of salivation are concerned, and it deserves to be considered one of the most efficient modes of relief to the suffering produced by cancer of the tongue in all cases in which an operation for

the removal of the disease is not desirable or practicable. Moore's method is to be preferred to that of Hilton (for the former divided the nerve further back), and becomes more applicable when cancerous disease lays hold of the floor of the mouth. The good effect of the operation is instantaneous. I have found that pain ceases in the tongue, ear, face, and head, and that the flow of saliva is greatly diminished; the relief besides is continuous, the nerve appearing not to reunite.

To Chassaignac, however, are we indebted for inventing and successfully using the wire *écraseur*, and by its means first removing the tongue from the interior of the mouth without any external incision; this was a great advance in surgery.

Cloquet, Arnold, and others strangled the tongue by making an incision in the hyoid region, carrying the ligature by means of long needles through the base of the tongue, and then drawing them tight through the aperture in the neck, so as to constrict the diseased mass and cause the organ to slough away.

Regnoli, of Pisa, published in 1838 a description of a method by which the whole tongue could be successfully removed. He made an aperture into the floor of the mouth in the mylo-hyoid space; the tip of the tongue being seized, the organ was drawn to its full extent down on the anterior part of the neck, when the whole tongue was shaved off from the base of the epiglottis and hyoid bone by means of the *écraseur*.

Nunneley, of Leeds, devised an ingenious mode of applying the *écraseur* so as to remove large portions of the tongue as far back as the hyoid bone. I will

give a short description of his operation:—It consists in passing the chain of the *écraseur* through the centre of the mylo-hyoid space by a needle into the mouth close to the *frænum*; two or three curved and strong harelip pins are now passed deeply into the tongue, obliquely behind the seat of the disease, their points being made to project forwards below the organ, so as to prevent the chain from slipping; the loop is now gradually tightened, and the tongue cut off obliquely from behind forwards.

I must not go too far into the literature of this subject, for if I do I may get into trouble, and fail to give credit where credit is due.

I beg to refer to Mr Thomas Bryant's interesting lecture given by him at Guy's Hospital and reported in the '*Lancet*' of February 24th, 1874, under the head of "Bloodless Operations, as illustrated by the use of the Galvanic Cautey."

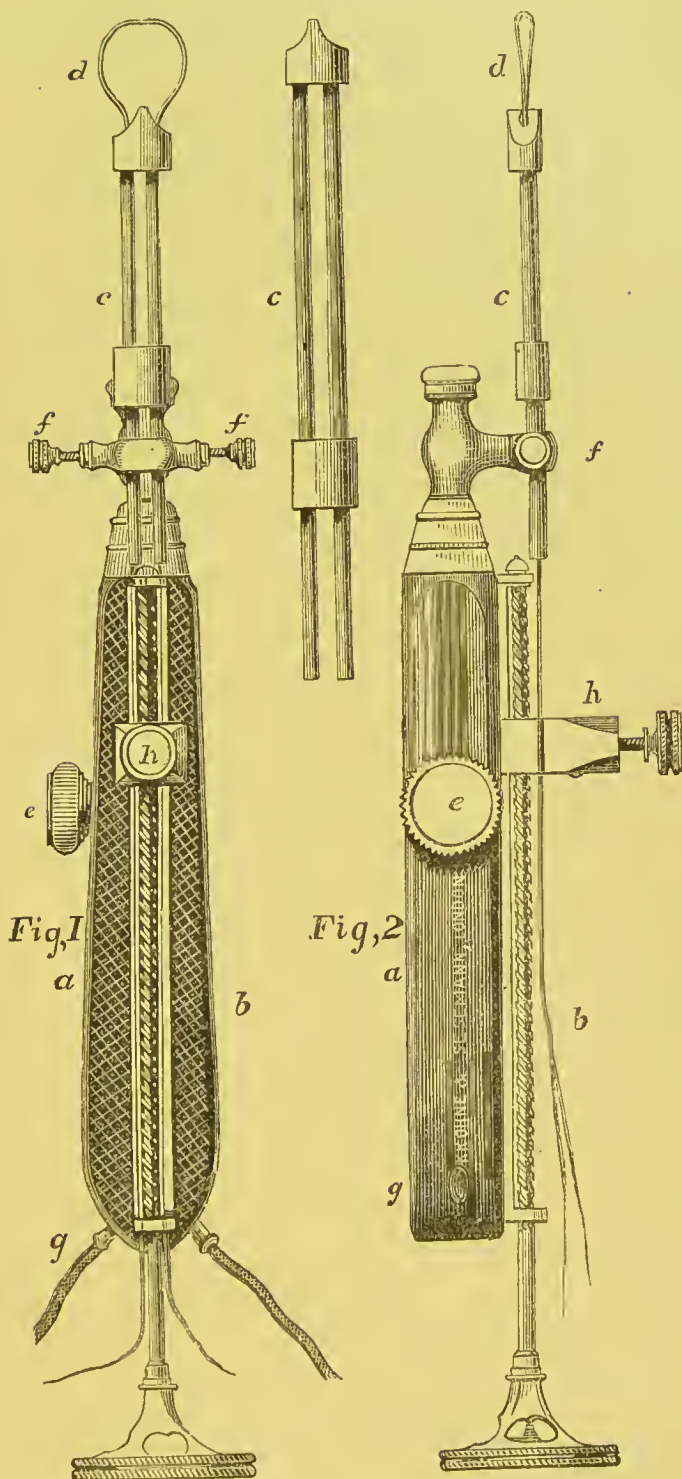
In giving a description of the instruments and in showing a woodcut of some, I shall have to apologise\* to Mr Bryant for following him to a great extent, my only excuse being that the subject is well worthy of repetition.

Mr Bryant there states that to Dr Middeldorpf, of Breslau, are we really indebted for the introduction of the splendid battery and set of instruments which have rendered the galvanic cautey an agent of practical use, for in 1854 he published a mono-

\* Since the above paper was published my attention was drawn to a pamphlet, and which was kindly sent to me by the author, Mr Walter Whitehead, F.R.C.S.E., Surgeon to St. Mary's Hospital, Manchester, and which was a reprint from the '*Lancet*,' Feb. 8th, 1873, "On Removal of the Tongue for Cancer by the Galvanic Ecraseur." I must apologise to him for not having seen his paper at the time I wrote mine.



WOODCUT 19.



WOODCUT 19.—Fig. 1 gives a front view of the galvanic écraseur, and Fig. 2 its side view.



graph on the subject, and in 1868 Dr Middeldorpf sent over to Dr Hermann Beigel a battery and a set of instruments, and through Dr Beigel's courtesy Mr Bryant had an opportunity of using them.\*

Since 1875 we at the Cancer Hospital have used the galvanic *écraseur*.

I will now explain the instruments, and pass through the different steps of the operation, for removal of the whole tongue. To commence, then, with the necessary appliances. The battery in use is one of Grove's with five cells. Messrs Krohne and Sesemann recommend Bunsen's (carbon and zinc) of four cells. The battery must be in good working order, or the required heat will not be maintained. I may here say that if the instruments are imperfect some break in the galvanic current is sure to take place. Before operating the surgeon should therefore test the battery and instruments that are to be employed, and in this way save trouble and prevent disappointment or possibly failure. (Woodcut 19.)

The instrument consists of four separate and separable parts. *a*, The handle; *b*, a screw on which travels a clamp (*h*); *c*, cannulæ through which the wire passes; *d*, platinum wire loop; *e*, ivory "interrupter" to connect or break the galvanic current by slight pressure of the thumb; *ff*, sockets into which the cannulæ can be fixed by screws; *g*, receptacle for connecting wires from battery; on the long screw (*b*) rides the clamp (*h*), between the jaws of which the ends of the platinum wires can be fixed by a screw. A gag, artery forceps, ligatures, a

\* Mr Bryant operated by its means on Feb. 25th, 1869, Oct. 14th, 1871, and May, 1872.

strong whip-cord ligature, scalpel, and a couple of Sims' wire guides (Fig. 20) complete the apparatus.

FIG. 20.



The patient being placed on the table and brought under the influence of the anæsthetic, a vertical submental incision (after Nunneley) is made in the centre of the mylo-hyoid space, and the opening freed into the floor of the mouth in front of the frænum of the tongue. Slight bleeding takes place. The passage is enlarged by means of the two forefingers working against one another sufficient to allow the nozzle of the cannulæ (*c*) to pass through. The gag is then placed between the jaws, and the mouth kept open; the whip-cord ligature is passed through the raphe about an inch from the tip of the tongue. The cannulæ (*c*), freed from the handle, and with the wire loop (*d*) drawn home, the nozzle of which is then passed through the submental incision up into the mouth. The wire loop is then, by means of a forceps, drawn out from the nozzle of the cannulæ to form a loop (*d*), through which the tongue, with its whip-cord ligature, is introduced, and the tongue being gently drawn forwards by an assistant the operator carries the loop (*d*) back over the root of the tongue up to the epiglottis. The assistant now gently pulls on the free ends of the platinum wire, so as to tighten the loop (*d*), which the operator gets into position by means of his two forefingers, and which he retains *in situ* by means of the wire guides (Fig. 20), one on either side of the tongue. Now the cannulæ and the free ends of

the platinum wire are passed through the sockets (*ff*) of the handle (*a*); the screws (at *ff*) are then screwed tight, and the cannulæ fixed. The ends of the wire are then fixed between the jaws of the clamp (*h*) by a screw. The screw (*b*) on which the clamp (*h*) travels is then gently worked sufficient to fix the loop round the root of the tongue. All being satisfactory, the connecting wires from the battery are placed and fixed in the receptacles (*g*), the ivory nut (*e*) is now screwed home, the galvanic current is completed, the loop reddens, and the *écraseur* is at work. The screw (*b*) is then gently worked, and, above all, the process of tightening should be very slowly performed. The wire of the *écraseur* being screwed home only as it becomes loose by cutting through the tissues, any force may break it. The tongue is gradually burnt through in from seven to ten minutes, and, being detached, is drawn out of the mouth through the lips by the assistant. The operator immediately breaks the current by unscrewing the ivory nut (*e*), and removes the nozzle of the cannulæ from the mylo-hyoid space. If the lingual arteries begin to bleed they are easily seized and tied. The tongue is found severed obliquely from behind forwards. The gag is then released, and the submental incision brought together with a horsehair suture and strapping, the operation is complete, and the patient taken to bed.

Whenever bleeding follows the operation that has been described it is from one of two causes: the wire cautery has been used at too great a temperature, or has been screwed up too rapidly. Hæmorrhage is, however, easily restrained, either by the application of iron-lint or ice.

The introduction of the galvanic cautery has so benefited and simplified the operations on the tongue that the surgeon can by its means isolate the disease with ease. He can satisfy himself that the whole tumour is under his control, his operation is bloodless, and he need in no way expedite his movements. Before the introduction of the galvanic écraseur operations on the tongue were very rarely performed. Now, however, it is different; they are of common occurrence, and, by these means, operations on the tongue for cancer I am inclined to believe are more successful than when they are undertaken by any other means.

“Thermo-cautère:” another most useful instrument when only partial operations are required on the tongue, by which small pieces can be removed, or where cauterisation has to be done. I allude to the “thermo-cautère” devised by Dr Paquelin. The instrument can be applied in all cases which can be treated by the actual or the galvanic cautery. It is heated by the combustion (without flame) of a hydro-carbonic substance to any degree of heat, from a dark red to a white heat, or *vice versâ*; when the cautère is heated to the necessary degree, it can be instantly revived without interruption. The small yet effective heated point required allows the hand of the assistant to help the operator.

Its construction rests on the quality of the platinum, which, being once heated to a certain degree, receives a still greater heat when in contact with the gaseous mixture of air and benzoline, and maintains this heat as long as the before-mentioned gaseous mixture remains in contact with it. The point of combustion forms the cauter; it consists of a



hollow platinum tube, which can be made of any shape to suit the requirements. Two tubes are joined, one conveys the gaseous mixture up to the cauter, which is fixed on the outer tube, and the other allows the gas to escape at the side holes, at the end nearest the handle; the inner tube can also be screwed into a corresponding one in the handle. The square bottle which contains the benzoline is furnished with a hook, by which it can be suspended in a button-hole; it is closed by means of an india-rubber stopper which has in its centre a double metallic tube, one end of which receives atmospheric air from the bellows, the other gives exit to the air charged with the benzoline vapour. The bellows is one of Richardson's, and worked by the hand or foot. Two india-rubber tubes, one of which connects the bottle with the handle of the cauter, the other connects the bottle with the bellows.

To use it, hold the platinum point steadily in the white part of the flame of a spirit lamp for about a minute, then press the bellows gently and continuously; a cracking noise announces when combustion commences, and the platinum cauter becomes red hot—the dark red heat is the best degree suited for hæmostatic purposes. Unfortunately, if anything goes wrong with any part it has to be sent to Paris to be repaired to Collin et Cie, 6, Rue de l'Ecole de Médecine, or through Messrs. Krohne and Sese-man. The instrument is fitted and can be fitted with any shape bulb or any shape knife.

I have recommended the instrument to some of my veterinary friends, who now employ it largely, and find it most useful in their practice.



## CHAPTER XXXII

### EPITHELIOMA OF THE ŒSOPHAGUS

WE are greatly indebted to the labours of Dr Hamburger, an Austrian physician, for an addition to the method of examining the gullet by œsophageal auscultation.

In investigating diseases of the œsophagus, the objective signs have, up to the present, been principally studied by means of the bougie or œsophageal sound. Much valuable information can be obtained with the bougie, but its use is attended with some inconveniences. It is a very disagreeable method of examination, and with nervous women (in whose cases differential diagnosis is often of the greatest importance) the introduction of the bougie often causes spasm of the œsophagus, and may wrongly lead one to imagine that an organic stricture exists.

Auscultation of the œsophagus is very easy, but it requires considerable practice and much patience.

Information cannot only be obtained as to the passage downwards of the small portion of fluid (be it water or some thickened fluid, such as gruel or arrowroot, which answers better), but its regurgitation can also be perceived when from any cause it cannot descend into the stomach. And the mode in which this regurgitation takes place sometimes

enables us to distinguish between a spasmodic and an organic stricture; for whilst in the latter an appreciable time elapses before the food is forced upwards, in spasmodic stricture the regurgitation is instantaneous.

Difficulty of swallowing may depend on a general awkwardness in the whole act of deglutition, or on a distinctly localised trouble. Deglutition being one of those compound acts which, though voluntary in its early stages, afterwards becomes involuntary, it is natural that it should be greatly influenced by anything affecting volition. Hence it happens that the mere idea of being able to swallow often produces such a paralysing influence that the inception of the act is disturbed. It is therefore obvious that we have to deal with very complex phenomena, and any addition to our means of diagnosis must be accepted with gratitude.

Valuable, however, as are the various special modes of examination, it is most important to pay particular attention to the general condition of the patient. Above all things in œsophageal cases one must notice the general state of nutrition. As diseases of the œsophagus always give rise to dysphagia, and dysphagia leads to the smaller amount of food being taken, it is obvious that in any serious disease emaciation must exist. If, therefore, a patient complain of long-standing dysphagia, and yet present no sign of losing flesh, one may be sure that there is no organic disease.

Organic disease of the œsophagus is extremely rare under thirty-five years of age, and its most common period of development is between fifty and sixty. It is well to bear in mind that syphilitic

disease of the Œsophagus is far more common in men than in women. It is rarely met with under thirty, most commonly it is found between forty and fifty, rarely after the latter age. Nervous affections of the Œsophagus, of course, most commonly affect the female sex; they are frequently met with in young delicate girls of the upper classes, but women of all ages and social conditions suffer. The men who are affected are always those of highly emotional temperament. Simple loss of power is, as might be expected, most commonly met with in old people. Here there is often a difficulty in making out a differential diagnosis between impaired innervation and malignant disease, but the absence of expectoration in the former cases is the determining point.

The questions which arise are: First, what is the nature of the narrowing of the Œsophagus? Secondly, how is it that, if the patient be able to swallow liquids, and even semi-solid substances, a bougie cannot be passed through the stricture? The reply to the first question is that the narrowing is caused by malignant disease; we often meet with cases of extrinsic narrowing of the Œsophagus dependent upon mediastinal tumours where the recurrent laryngeal nerve is involved, but I have never known any intrinsic disease of the Œsophagus, except cancer, to be associated with pressure on the recurrent nerve. Syphilitic disease of the Œsophagus never gives rise to pressure on either of the recurrent nerves. With regard to the second question, the impossibility of passing a bougie is no doubt to be explained by the occurrence of a certain amount of spasm when an instrument is introduced.

In the healthy condition a certain quantity of saliva is being constantly unconsciously swallowed, but in stricture of the œsophagus the mucus collects above the seat of stricture, and when a certain accumulation has taken place it begins to be expectorated. The increased expectoration so often observed is probably due to dilatation of the gullet above the seat of stricture, not, as might be imagined, to ulceration of the surface of the œsophagus. The continued obstruction at the seat of stricture leads to slight, often very great, dilatation, and this dilatation produces a pouch-like cavity.

The implication of the recurrent nerve not only assists in diagnosis, but it also affects prognosis, for in itself it increases the dysphagia, and thus aggravates the starvation which slowly leads to death. We must, however, remember that paralysis of the vocal cords often produces dysphagia, even when there is no disease of the œsophagus. The contraction of the pharynx, from its structure, must be in the lateral and posterior parts, as the constrictors only form a segment of a tube; it is very rare to meet with spasmodic tightening in the pharynx, or with what may properly be called permanent stricture; when there is obstruction to the deglutition there it is generally owing to tumours springing from the laryngeal cartilages, or embedded in the substance of the pharynx, or polypous excrescences within it. Many deep-seated glands exist, and when these swell, extrinsic dysphagia may be produced, even before there be much tumour externally; but in most instances the gland becomes very large before great impediment to deglutition be occasioned. According to the narrowness of the induration and the straight-



ness of the canal passing through it will, *cæteris paribus*, be the ease of passing the bougie.

The first circumstance which calls the attention of the patient to the local disease is difficulty of swallowing a morsel of the same size he used to do. Even that size which can still pass requires to be swallowed more slowly. He is obliged to masticate more completely his food, and put less at a time into his mouth, otherwise the morsel sticks in the passage, and he has much spasmodic action excited. The constrictors are thrown into strong action, and operate on the larynx, so that, independent of any pressure by the morsel from behind, there is difficulty of breathing, with livid face. If the morsel cannot be forced down, the muscles, after a struggle, invert their action, and it is brought up along with much viscid or glairy mucus from the pharynx. Very early, sometimes before the dysphagia appears, the digestion is impaired, and the bowels are generally torpid. The indigestion increases with the disease, and the bowels become more costive. The countenance is sallow, and the body wastes, whilst the strength sinks for want of nourishment, from the sympathetic effects of the disease on the system, independent of mechanical causes, and from the frequent and severe fits of struggling and suffering which are produced. Death may then take place before the obstruction be complete; but life may be protracted till the gullet be completely closed. In such cases and in those approaching to them the pharynx is much distended. I have seen a patient able to retain for a time, without much inconvenience, several ounces of fluid, which at last were vomited. In a case where the obstruction was



seated just above the cardia, and was about an inch and a half long, the patient could never take any meal without eating very slowly and masticating very carefully, and at the same time taking a draught of fluid to wash down the bolus of food as soon as it entered the gullet. He never partook of any meal of which he did not bring back some portion, and this he always persisted in saying was done by an act of coughing. I have often passed a bougie for him, and it always was followed by his coughing up more or less of the solid or liquid food taken within the last few hours. After death the œsophagus was found enormous, being as large as one's wrist, its walls being of great thickness, from the increased muscular thickness of its coats. It measured six inches in circumference, of nearly uniform size throughout, although slightly bulging in two parts. On placing the little finger inside the stomach, it could be just squeezed or forced through into the œsophagus. The stomach was healthy and natural. Another case, the only parts in which any disease was found were the œsophagus and certain structures in its immediate neighbourhood, the upper part of the œsophagus was rather less than an inch in diameter. This size was maintained as the gullet descends until a point about four and a half inches from the cardia. Here it became slightly dilated, its diameter reaching one and a half inches. About two inches lower it again became narrower, forming a funnel shape terminating at the cardiac orifice, through which the handle of a pen could hardly be passed. At its widest part the wall of the œsophagus presented a large irregular opening, two inches in length, which was evidently in part the

result of ulceration; on one side the lung was adherent. This was an epitheliomatous growth.

One, however, of the irregular modes of onset of epithelioma of the Œsophagus which has lately been noticed by Mr P. Thornton and by Mr Butlin ('Lancet,' April 16th and 18th, 1881) is when a sudden obstruction to the passage of food is the first symptom, and which must be accepted as very important in relation to the diagnosis of the disease, because sudden and extreme dysphagia attacking a person in apparently previous good health is a rare condition, and it is often difficult to account for the suddenness of the attack, coupled with the absence of other signs. Sir James Paget, who saw the following case of Mr Thornton's, says that he has never before known sudden obstruction to the passage of food to be the first symptom in cancerous stricture of the gullet.

Major —, aged 62, consulted Mr Thornton on March 23rd, 1880, on account of dysphagia which had troubled him for three weeks; he was then unable to take solid food, and liquids only with difficulty. He said that the stoppage had come on suddenly during a meal, when he was apparently quite well. Finding himself unable to take anything he became very nervous, and for some hours would not make any further attempt to swallow, and when he tried he could only manage a teaspoonful of fluid at the time. On examination a stricture was found at the upper part of the lower third of Œsophagus, through which the smallest-sized bougie could not pass. The patient was well nourished in body, nor had he noticed that he had lost flesh. His face was anxious, but presented no appearance

of a cancerous cachexia. There was a murmur to be heard in the cardiac region. He died a few weeks afterwards.

At the post-mortem examination there was found a cancerous stricture, annular, but not complete, about one inch and a half above the cardiac orifice.

Mr Butlin reports :—1. That the first case is recorded in the ' Pathological Transactions ' for 1859, by Dr Baly. The patient, a gentleman, aged 56, while at dinner felt that the solid food he had swallowed lodged opposite the lower part of the chest, and he was obliged to leave the table and reject it. At the end of a week the same thing happened again, and was relieved in the same fashion. From that time it frequently occurred, and five or six months later the patient died from a tolerably extensive epithelioma two inches above the cardiac orifice of the œsophagus.

2. The second case is related by Dr Traube in the ' Archiv der Heilkunde ' (Bd. xvi, S. 282). The patient, also a man of 56, felt a piece of hard beef stick in the œsophagus one day during the month of October, 1873. From this time he experienced great difficulty in swallowing, and in May, 1874, died from widespread epithelial ulceration of the middle portion of the œsophagus.

In all cases where we suspect this disease to exist, after trying the auscultation of the œsophagus after Hamburger, we may ascertain it by the probang, which ought to have a bit of soft sponge firmly attached to its extremity. The whalebone should be so slender as to be easily pliable, as it thereby runs more readily along the pharynx. It is to be introduced over the tongue to the top of the

pharynx, and the finger placed on the back of the point so as to bend it fairly down into the pharynx. It will also pass more easily if the mouth be well opened and the head bent somewhat back. If it stop and, after pausing a moment, does not go on, there is an obstruction. Before withdrawing the instrument we should mark that part which corresponds to the front teeth of the upper jaw, which, when measured to the point, will ascertain the situation of the stricture. This may be in any part of the œsophagus, but it is usually at its very top, where it joins the pharynx at the cricoid cartilage. We next try a probang with a small rounded end, uncovered with sponge, which being smaller generally passes with more or less facility.

All food must be very nutritious and non-irritating. Alcoholic stimulants are injurious when there is organic disease, whether malignant or inflammatory. On the other hand, they are very beneficial in cases of functional weakness, especially if taken at the commencement of the meal. Fluids alone should be used where there is organic disease; solids or semi-solids in the neurotic cases. Freshly cooked meat converted into a paste by a sausage machine, and served with gravy, can sometimes be taken even better than fluids. Milk, however, always remains the staple diet, and the patient should be encouraged to take several pints a day. I have known many cases of difficulty of swallowing, even in cases of organic disease, when the treatment can, at the best, be only palliative, assisted by a set of teeth, improved mastication may prevent the troublesome *contretemps* of the sudden arrest of a foreign body in the œsophagus.



The occasional use of the probang or bougie mechanically to dilate the stricture has been often resorted to, but with very little benefit, for the effect, if any, must be temporary. Still, if this do not irritate, we may thus keep the passage longer open.

The introduction of the flexible tube from the nostril is more likely to be serviceable if it be retained for some time, whilst it enables us to inject fluids into the stomach. But we must not forget that it may excite the part and cause more swelling or suppuration, for this stricture is not a simple contraction of healthy structure, but is a diseased organisation.

The operation of œsophagotomy or rather pharyngotomy may be required, on account of substances impacted in the end of the pharynx. The danger of pharyngotomy is not from the hazard of injuring vital parts, but from the inflammation which may be produced in an important part already diseased, if not inflamed, by the cause requiring the operation.

*Œsophagotomy.*—The following, though an isolated case, is so important that I give a short abstract ('*Deutsche Klinik*,' 1865, Nos. 4, 5, 8, 9, by Prof. Bruns). Œsophagotomy for pressure of the œsophagus supposed to be from disease of the thyroid. Successful. Death afterwards in consequence of tracheotomy, rendered necessary by commencing œdema glottidis. The patient, a man, aged 37, was operated on for œsophagotomy on November 5th, 1864. He had suffered from dysphagia for about a year. No cause was known, nor could any be discovered by examination, except a thickening of the left lobe of the thyroid, which was thought to compress the œsophagus. The tube was absolutely



impervious to instruments, which were arrested at the level of the cricoid cartilage, but the patient could swallow a little fluid, though with great difficulty and so slowly that, though he was all day attempting to swallow, he was always hungry, and was gradually sinking.

The operation consisted in dissecting down to the œsophagus (or pharynx) on the left side, at a level with the obstruction. Then a silver catheter was passed from the mouth and the canal opened upon it. Still it was impossible to pass the catheter through the obstruction into the stomach. But after dissecting and tearing the thyroid body away from the œsophagus, it was found possible to pass a small œsophageal tube, having a cavity of three millimètres, from the wound into the stomach. This was left in the wound, and the patient was fed through it with as much liquid as he chose to take. (It was noticed that the presence of this tube, whether its end lay in the stomach or œsophagus, caused a great increase in the secretion of saliva.)

On the third day it was necessary to change the tube, and a thicker one was substituted. On the ninth day one a centimètre (about one third of an inch) in diameter could be passed. This was changed daily, and on the fifteenth day after the operation a silver, then an elastic, tube was passed through to the mouth guided by the laryngoscope. On the next evening an œsophagus tube one centimètre thick was passed from the mouth into the stomach and left in. This tube remaining in the mouth gave him much inconvenience—salivation, hindrance of speech, snoring in respiration and sleep, rotting of the tube, &c., and on the twenty-first day pieces

of ivory, fastened to a string and passed into the strictured part by means of a pair of œsophagus forceps, were employed to dilate the stricture. These were withdrawn to nourish the patient, who now began to swallow by his own efforts. The wound was almost healed. Everything now seemed going on well, except that the temperature kept above the normal standard, with exacerbations every four days. On December 3rd (28th day), after a thicker ivory plug had been thrust through the strictured part, it was found, after withdrawing it in order to allow the patient to take some nourishment, that it was impossible to reintroduce it.

A small tube was with difficulty passed, and the attempt caused much dyspnœa. Soon it became impossible to pass anything. Laryngoscopy showed œdema of the arteryno-epiglottidean folds, soon running into suppuration, and the patient sank into a semi-comatose state. Finally, on December 7th, tracheotomy was performed. Dyspnœa increased, with symptoms of commencing pneumonia; he became more and more comatose, and died December 9th. He had been nourished with milk since the operation, and some of it could be traced in the expectoration. On dissection the thyroid body did not show the enlargement perceived during life. The cervical glands were enlarged, the cellular tissue around the œsophagus infiltrated, and the œsophagus closely united to the spine. The walls of the œsophagus, for more than an inch in its whole circumference, just below its commencement, were gangrenous, below it was covered with epithelium on its posterior surface.

## CHAPTER XXXIII

### EPITHELIOMA OF THE SCROTUM

EPITHELIOMA of the scrotum, or, as it is commonly called, chimney-sweeper's cancer, is a disease of the skin which attacks the scrotum of persons who have been exposed to the contact of soot. It is generally developed in the form of a small pimple or warty excrescence, termed soot-wart, which often remains on the scrotum for months or even years, without undergoing any change; usually there is only a single wart at the lower part of the scrotum; sometimes there are two or three of different sizes, and occasionally they are so numerous and so abundantly and largely developed as to form a considerable cauliflower excrescence. After a time the wart becomes soft, excoriated, and red, and exudes a thin irritating discharge, which, becoming dry, forms an incrustation over the excrescence. After the scab has been picked or rubbed off by friction against the dress, ulceration ensues, destroys the wart, and produces a painful chronic sore, characterised by an indurated base, with elevated and sometimes nodular or overhanging edges and an irregular excavated surface, discharging a thin sanious fluid of an offensive odour. The ulcer, if suffered to proceed, increases widely, invading the

whole scrotum to the perineum, and laying bear the crura penis. At the same time it penetrates deeply the tunica vaginalis, which becomes firmly connected to the morbid scrotum and adherent to the testicle. The testicle is also liable to become involved in the disease, and to form the seat of a deep excavated sore. The glands in the groin often enlarge at an early period from irritation, but at length become indurated and diseased. After a time they soften, suppurate, and form large and deep ulcers in the groin, similar in character to the sore on the scrotum. The ulcer spreads towards its circumference widely and superficially, whilst in the centre it burrows deeply, until in many instances it reaches the greater vessels of the thigh, destroys their coats, and causes death by hæmorrhage. In other cases the inguinal glands remain unaffected; but ulceration continues to proceed slowly in the direction of the cord, and a frightful sore is produced, its progress being attended with severe darting pains. The patient's sufferings are protracted for many months and sometimes for years; losing his appetite and flesh, he ultimately sinks, worn out by his sufferings and the effects of the disease on his constitution.

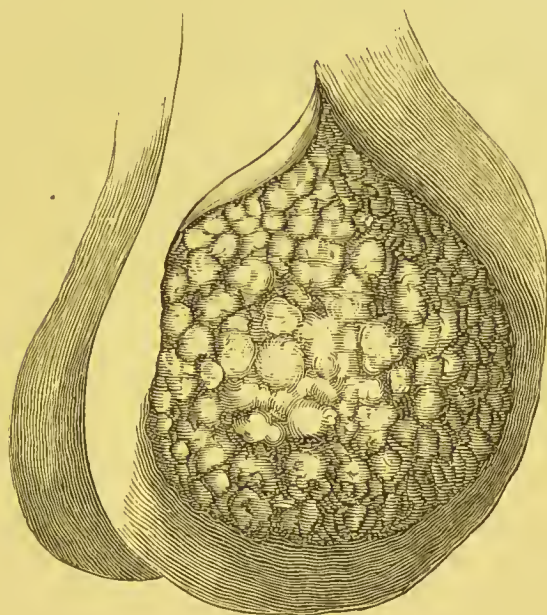
The small excrescence in which epithelioma of the scrotum usually originates is soft, vascular, and sensitive, and in many respects similar to the soft warts which occur on the internal membrane of the prepuce, and on the glans penis. The soot-wart appears to consist of a congeries of morbidly enlarged papillæ.

The following is a case amongst the drawings at the Cancer Hospital of chimney-sweepers' cancer, in



which nearly the whole scrotum is occupied by a cauliflower excrescence, which exhibits these papillæ in a very advanced state of development.

FIG. 21.



The morbid growth is composed of a number of projecting processes densely grouped together, of variable size, but many very large, with their summits lobulated, expanded, and elevated on narrow peduncles more or less flattened. The warty processes closely resemble the elevated growths abundantly developed about the epitheliomatous ulcer produced by soot on the back of the hand and wrist.

The soot-wart is sometimes covered with a dense and thick concretion, formed by successive layers of incrustation, the superficial still remaining attached so as to form a conical process.

The appearances presented by this disease closely



resemble those of epithelioma of the lip; the warty growth, as well as the sore, is infiltrated with epithelial cells. The disease is originally quite superficial. The cell-elements are the same in the inguinal glands as in the scrotum. Usually confined to chimney-sweepers, and occasionally seen in gardeners' hands, the irritating action of the soot on the skin is no doubt its exciting cause. A similar disease occasionally occurs in other parts of the skin, but the scrotum being seldom cleansed and well adapted to harbour soot seems more exposed to the disease.

Other irritating substances may excite this disease, I certainly have seen and excised an epitheliomatous ulcer from the scrotum of a man who had never been exposed to contact with soot; we must therefore conceive the existence of individual predisposition as a condition necessary for its development. This predisposition appears in some cases to be hereditary. I have a sweep now attending the out-patients' department at the hospital who will not submit to removal of the growth, who affirms that his father and grandfather both suffered from the same disease as himself.

Even amongst sweeps, a class of persons peculiarly liable to it, many hundreds have followed the occupation of chimney sweeping for years, and even during the whole of their lives, without contracting this disease; we must, therefore, as I said, conceive the existence of an heredity or of an individual predisposition as a condition necessary for its development. It appears that the seeds of this malady are sown in early life, but in general do not germinate until they have remained for some time dormant in

the system. It is known that persons who have been sweeps when young, but have given up the trade, have afterwards been attacked with "chimney-sweepers' cancer," although they have long been removed from all contact with soot. It has sometimes happened, after the morbid parts had been completely extirpated and the wound healed, the patient having avoided further contact with soot, that the disease has reappeared, as it were, afresh, a second or even a third time, not, however, in the cicatrix of the wound, but on a different part of the scrotum; these and similar facts lead to the conclusion that though abandonment of his trade may render the adult chimney-sweeper less liable to epithelioma, it by no means forms a satisfactory security against its recurrence.

Epithelioma of the scrotum chiefly extends its ravages by infiltrating the contiguous tissues, and has little disposition to contaminate the lymphatic glands or distant parts.

In a case which ended fatally of diffuse inflammation arising from a large epitheliomatous ulceration and abscess in the groin, consequent on epithelioma of the penis, for which the organ had been amputated two years previously, on examination the lumbar glands and internal organs were all healthy. This and other cases show that the disease not only remains limited for a long period to the glands immediately connected with its primary seat, but, in some instances, destroys life without extending beyond them, or implicating more distant parts.

Epithelioma of the scrotum is a disease quite beyond the control of topical and internal remedies.

Time has been lost in attempts to eradicate it by chloride of zinc or various other applications; nothing hitherto tried has proved of any avail, in arresting its destructive progress.

There is, indeed, no effectual remedy but the knife; and fortunately this is a resource attended with a greater share of success than generally awaits operations on epithelioma in other parts.

When the scrotum is alone affected the proceeding is very simple. The morbid parts are to be removed by two elliptical incisions, care being taken to cut wide of all disease, for if any part of the infiltrated tissue be left behind the complaint will certainly reappear. The inguinal glands are so seldom contaminated at an early period of "soot-cancer" that, as a practical rule, simple enlargement of them, which often arises from irritation, does not constitute an obstacle to the excision of the diseased scrotum. The edges of the wound are brought together by horsehair sutures and then dressed antiseptically, when all generally heals kindly.

The effect of the operation would seem to be the eradication of all existing disease, but unfortunately not to destroy the heredity or individual predisposition to its development in the parts that remain, which may subsequently, therefore, become a fresh seat of disease, especially if, as often happens, the individual continues exposed to its exciting cause—the soot.

If it should reappear after excision it must be met as if it were a local and a new deposit, not the return of an old one; and the second operation may be undertaken on the same grounds and

nearly with the same hope of success as in the first instance.

When the inguinal glands are hard and painful and infiltrated it has commonly been considered that no operation is advisable, but that such should be the rule of practice is clearly questionable. It has been shown that "soot-cancer" does not readily extend beyond the inguinal glands or those nearest to the primary seat of disease; under these circumstances it is right to conclude that the glands in the groin, when affected, may be excised with a fair hope of prolonging life and with some prospects even of eradicating the disease. The operation has been performed in several instances.

When the inguinal glands are extensively ulcerated, or the disease has spread too far to admit of being effectually extirpated, there is nothing to be done but to endeavour to mitigate the patient's sufferings by opiates or anodyne applications, and to correct the irritating fetid discharges.

### EPITHELIOMA OF THE PENIS.

Epithelioma takes its origin as a primary disease in various parts of the penis; the organ is likewise exposed, as we have already seen, to be attacked by the extension of this form of growth from a primary centre situated on the scrotum. Its most favourite seat is at the preputial edge of the glans penis, next at the reflected layer of the prepuce, then the glans itself, and lastly the body. Amongst the causes regarded as tending to the development of the disease the one holding the foremost place is congenital



phymosis; the degeneration of long-standing venereal sores has, in some instances established it; the inability on the part of any adult to completely expose the glans is a serious consideration in reference not merely to the very certain retention of irritating secretions, but also to the question of the condition, very probably determining the commencement of morbid disease; it is one that the inconvenience had better be removed before it becomes the source of the disease.

It is not commonly met with under forty years of age, frequent, however, between this and sixty, and by no means rare in extreme old age.

The first appearance of the disease is often as a small wart or pimple; this, as it grows, gets rubbed or picked off, and a scab forms; under this begins a sore which slowly spreads but does not penetrate deeply, and has its edges slightly raised, irregular, and hardened. When the disease is concealed by phymosis, and after existing for some time is brought to light by slitting up the prepuce, the warty vegetations have in some cases a pinkish colour and are closely and firmly packed together. As the disease advances the growth thickens the prepuce; the corpora cavernosa become infiltrated in like manner, and convey an exceedingly dense, hard feel to the touch; the glans as well as the corpus spongiosum urethræ become similarly invaded; the canal of the urethra is frequently penetrated or the meatus is closed, and in either case urinary fistulæ result; surely and slowly the ulcerating process spreads; in its course penis and scrotum disappear, until a mere mass of granulations mark their seat, over which the urine dribbles away



from that portion of the urethra that happens to be left. The glands of the groin may become affected at any time after the commencement of the disease, and possibly become enlarged by sympathetic irritation at a very early period of its development, no matter in what part of the penis the epithelioma may be situated; later, in the course of the disease, they become the seats of infiltration, and subsequently form wide and destructive ulcerations.

The effects of epithelioma of the penis are usually confined to that organ and the glands in direct anatomical relation with it.

Death ultimately takes place from exhaustion consequent on the continued discharges, and in some cases it is materially hastened by the hæmorrhage, which is frequently of a very severe character, more especially when it occurs from the ulcers consequent on the destruction of the lymphatic glands in the groin. Scarcely any pain is attendant on the growth during its progress, in its early stages, indeed, by absolutely none at all, and in its later ones by far less than its peculiar locality would seem to suggest and the very great rapidity of the ulcerative process would render probable.

The development of epithelioma in the penis may require the removal of either a part or the whole of the member. If the ulceration be of limited extent, and its situation admits of its complete excision so as to leave only healthy parts behind, the partial amputation is to be preferred; where, however, the thickening involves the whole of the glans or infiltrates the cavernous bodies, amputation of the whole should be performed.

As a rule, where the glands in the groin are

involved no operation should be recommended; cases, however, will present themselves where, despite this implication, it will be highly proper, as a palliative measure, to remove the primary disease in order to escape a very foul and extensive ulceration.

## CHAPTER XXXIV

### EPITHELIOMA OF THE LABIA PUDENDI

EPITHELIOMA of the nymphæ and clitoris is by no means of frequent occurrence, as compared with the instances of the same disease in the neck of the uterus ; it is even rare, and it is by no means as common relatively as it is in the external organs of men. Its appearance as a primary disease is usually in the form of a small nodule, pimple, or wart, situated on the clitoris or nymphæ or on the labia themselves. In its further progress it closely imitates the features which mark the extension of similar disease in the scrotum and penis. After a time, in like manner, the glands in the groin become implicated ; the ulcerative action spreads from the original centre over the adjacent soft parts, the secondary affection of the glands form vast additional sores, and the patient succumbs to the same series of irremediable conditions that constantly attend on this variety of growth in other parts.

In some cases it assumes from the first rather a tendency to increase by warty or tubercular growths, which often attain a considerable volume, implicating gradually the whole of the labia and the clitoris itself, and breaking out into ulcerations having the characteristics of epithelioma. At its earliest stage it is attended by little inconvenience, at most, some

itching or smarting; but later, its extension gives rise to great suffering, aggravated by the contact of the urinary and menstrual discharges.

It is most commonly met with at the middle period of life, from twenty to fifty.

The only plan to be adopted is widely and deeply to excise the first appearance of the disease; whatever doubt may exist as to the nature of a limited growth in an early stage, situated in these parts, that doubt should be given in favour of a complete removal, as by such a measure a return of the epithelioma may be prevented. In cases where the parts are more extensively involved it may be desirable to carry out a more serious proceeding, such as the removal of the entire clitoris with the nymphæ; in such instances care should be taken to clear away all indurated parts, and with this object the lining membrane just within the vagina should be carefully examined as well as the folds of the skin at the anus. In no case should an operation be recommended where the glands are enlarged, save when the chief object is the temporary removal of an offensive and distressing sore.

The tendency of this disease is to return after operation at or near the seat of the primary growth; if the general conditions are not such as to preclude a second excision, it should again be removed.

## CHAPTER XXXV

### EPITHELIOMA OF THE OS UTERI

EPITHELIOMA of the uterus commences in the cervix uteri, from thence extends downwards to the os, and upwards towards the fundus; it appears to have its origin in the structures around the neck. It is more frequently found in females about the period of the cessation of the menses.

The symptoms that precede the disease are occasional pain or uneasiness in the pelvis, a sensation of heat, leucorrhœa, &c.; these sometimes are considered of no moment, or are so slight that they are disregarded, and the first symptom that excites the apprehensions of the patient is hæmorrhage. If an examination be made at the time, we shall be surprised at the extent to which the disease has proceeded; the ulceration is generally of some considerable size, having a rough and granulated surface. During the examination, even when the finger is passed over the ulceration, the patient does not complain of pain; nor does she wince when pressure is made on the ulcerated part; but she merely expresses herself as feeling sore. In each case the situation and course of the ulceration will be found to vary; there is no glueing of the pelvic contents together, rendering them immovable, as in carcinoma uteri; the hæmorrhage which may first



have excited the alarm in the mind of the patient will continue to recur at intervals throughout the disease, and between the intervals of bleeding there is a secretion of thin, ichorous, offensive fluid, its colour varying from a straw colour to a dark brown; very rarely it is purulent. In some cases the pain is relieved by the hæmorrhage. It appears also to have some slight effect in controlling the progress of the disease. The extension of the local mischief is accompanied with marked constitutional symptoms. The patient emaciates, she loses her appetite, she has sickness, the secretions are disordered, the bowels are irregular, the pulse quick and small, the skin dry and sallow, and there is considerable fever. She complains of weakness, a sensation of weight and pain in the back, extending to the loins or round the lower part of the abdomen. The pain is variable; sometimes it is lancinating, sometimes burning, sometimes dull and heavy, and in a few cases no pain whatever is complained of. As the disease proceeds the features become sharpened, the eyes sunk, the dark circle around the eyes increased, the patient emaciates still further, there is more fever, less appetite, constipation of the bowels, and, as the ichorous discharge increases, there is frequently excoriation of the vulva and external genitals. The most frequent method of termination is by exhaustion; the patient's constitutional powers are broken down by the continued discharges, sanguineous as well as ichorous. Occasionally, fatal hæmorrhage will occur, but this is by no means a common termination of the disorder. Not unfrequently diarrhœa supervenes, and when this is the case it rapidly destroys what little power of

life the disease has left. In some instances the peritoneum becomes inflamed, and when this occurs, it rapidly hurries off the suffering patient. Passing through our uterine wards at The Cancer Hospital every stage of the cancerous disease can be observed almost by looking at the countenances of the unfortunate sufferers as they lie in their beds, mentally saying to yourself, what can be done? The responsive answer comes—nothing.

The disease with which epithelioma is most commonly confounded is ulcerated carcinoma. The time of life at which they make their appearance, the discharges, the emaciation, the febrile excitement, are the same in both.

The diagnosis can alone be formed by examination “per vaginam.” If the disease be epithelioma of the uterus, there will be no deposition of new morbid matter; and the uterus, or as much of it as may be left, may be moved about by gentle pressure to a greater extent than in health, on account of the removal of some portion of the pelvic contents by ulceration giving more space; while in carcinoma uteri an extensive deposition into the surrounding cellular tissue, as well as into the structure of the uterus itself, will be found to have taken place; the increase of structure will render the organ more immovable, thus affording a valuable means of diagnosis in investigating the two diseases. An examination “per rectum should generally be made to confirm that previously instituted per vaginam.” Not unfrequently scirrhus carcinoma of other organs is met with where it exists in the uterus; whereas in epithelioma we do not find the disease implicating the other viscera of the body.

From simple ulceration of the womb it may be distinguished by the greater extent of the mischief, the foul and fetid discharges, the pain, and exuding character of the disease.

This disease is in almost all instances fatal, the length of time it takes to destroy life varying much in different cases. Patients are generally very far advanced in the disease before they present themselves to the notice of the medical man.

The treatment will necessarily vary according to the stage of the disease at the time the patient presents herself to our notice. If we see the disease before the solution of continuity has taken place, where there is merely fulness and heat, hip baths and laxatives will be found of avail. If the ulceration have commenced, cauterisation with the "thermo-cautère" or actual cautery may be practised. Great advantage may be derived from using injections of terebine, carbolic acid, *Liquor Ferri Perchloridi*, &c.

It is by means of these injections that the fetid odour of the discharges will be corrected, and in many cases the pains will be assuaged. If these remedies fail to arrest the progress of the disease, sedatives must be had recourse to to allay the more distressing symptoms. Great comfort is derived to the patient by washing out the vagina frequently. The bowels should be kept daily evacuated by occasional laxatives, as straining in the passage of the fæces frequently induces a repetition of the hæmorrhage. The patient's diet should be moderate, but nutritious, and of a mild unirritating nature; stimulants are of doubtful benefit.

If, when first consulted, we are certain of the nature of the ulceration, and if there be a septum of

healthy tissue between the disease and body of the uterus, we should act wisely by excising the os uteri. It is useless, however, to attempt this operation if the disease has extended to the body of the organ, or if the whole of the disease cannot be removed by the operation.

## CHAPTER XXXVI

### EPITHELIOMATOUS CAULIFLOWER EXCRESCENCE OF THE OS UTERI

A SUBFORM of epithelioma consists in the growth of a highly vascular tumour of a bright flesh colour, with a granulated surface, generally growing from a part or the whole of the os uteri, and sometimes also from the uterine cavity. Its structure is pretty firm, but still if pressed strongly by the finger it bleeds; it has a very fine membrane spread over it; this membrane secretes a copious watery fluid. After death the tumour disappears, nothing being left but a mass of flocculi, apparently empty vessels; the same effect takes place when a ligature is applied.

It is in most cases attached to the os uteri, but occasionally it grows from the cavity of the uterus, projects through the os, and extends even through the external parts.

“These tumours” says Professor Bennett, “speaking generally, are almost wholly composed of epithelial scales, which assume a square or elongated form, their nuclei being for the most part very distinct. In the larger growths the surface is similarly compressed, but internally consists of a fibrous structure, into which loops of vessels from the capillary network of the dermis is prolonged.”

The symptoms that mark the development and



progress of this disease are a moisture in the external parts, which soon amounts to a copious watery discharge from the vagina. The effects of this continual drain upon the system are soon felt and seen. At first the watery discharge is streaked with blood, but soon becomes a perfect hæmorrhage, which continues a longer or shorter time. Sexual intercourse, the evacuation of hardened fæces, or a digital examination will bring on the bleeding, but the patient does not generally complain of pain.

An unfavorable prognosis must be given in almost all cases of this disease. Patients are generally considerably anæmiated before they apply for advice, and not unfrequently their constitutional powers are too much depressed to admit of much being done. These cases terminate more favorably where the disease grows from a part of the os uteri, as then it is more easily encircled by a ligature; but, even under these circumstances, in many instances it is reproduced. The patient may die from syncope during an attack of hæmorrhage.

The treatment of these tumours consists, firstly, in the use of astringents and astringent injections to diminish the watery discharge, to lessen the size of the tumour, and to cause contraction of the vaginal walls which compass the morbid growth. The patient should be cautioned not to introduce the tube of the vaginal syringe too far into the canal, lest she should bring on hæmorrhage.

If the tumour occupy so much of the vagina that a syringe cannot be employed, the patient should be placed on her back, with her hips raised, and the lotion should be forced into the canal, or if the tumour be external, by means of a piece of lint the

lotion may be kept constantly applied. If this treatment do not succeed the ligature must be resorted to, and applied in the same way as in polypus uteri, and it is well to use a broad ligature. Two or at most three days suffice for the removal of the growth; unfortunately, in many cases the excrescence grows again, producing the same symptoms, and leading to the reperformance of the operation. This tendency to reproduction may be kept in check by the use of astringent injections or by the application of some caustics to the spot where the tumour grew.

The recumbent position must be maintained; the patient's diet must be bland and nutritious; stimulants avoided; the secretions kept free; the bowels open, for the evacuation of hardened fæces frequently leads to the reproduction of bleeding; sexual intercourse must be interdicted.

Where pregnancy is associated with cauliflower excrescence it frequently terminates with abortion.'

## CHAPTER XXXVII

### EPITHELIOMA SUPERVENING ON MOLES AND WARTS, AND ON SCARS.

SOME of the best marked examples of epithelioma take origin in or near to a congenital mole or wart.

When a mole commences to change, it is found that the spot where it is situated has become slightly hardened or increased in size, that the ordinary colour of the mole is disappearing, and that on its surface or near to it there is a tendency to the production of discharge and very slow ulceration; to these changes may be added a sense of itching and slight shooting pains.

Any change, then, in the aspect or feeling of one of these moles or warts, that perhaps has existed for years, should at once demand the attention of the patient.

The cause of this is unknown, and can only in any way be explained by the supposition that persons predisposed to cancer, and the subjects at the same time of such congenital deviations from the natural arrangements of the skin, are more liable to its development where these are situated than in other parts of the general surface.

Like epithelial growths in special parts of the body, the glands in direct anatomical relation with the region where these moles have undergone dege-

neration sooner or later become infiltrated, and in some instances form large swellings.

In the case of a wart becoming the seat of disease, very much the same series of steps may be noted to exist as have already been described as leading to the development of epithelioma of the lip—the formation and removal of a scab on the wart's surface by a scratch, and the gradual formation of a sore.

The treatment necessary for these degenerated structures is free extirpation; the use of caustics are useless, and internal remedies can be of no service.

Not only, where practicable, should a free breadth of skin be removed with the disease, but it is desirable also to take away a corresponding amount of the fascia beneath. The tendency will often be observed for the disease to recur in the cicatrix or near to it. It should again be removed, as the prospect of future immunity in the absence of glandular affection is found by observation to be by no means so unfavorable as might be expected from the recurrence.

Where the disease is situated on an extremity, and is of such an extent as to justify amputation of the limb, this proceeding should be carried out within such distance from its seat as to secure the patient from the least probability of any of the local manifestation being left. A mere excision of the affected parts, in the face of the confessedly doubtful degree of malignancy which many of these cases in their earlier history possess, cannot as a rule be successful.

The distinction between sarcomatous growths and epithelioma occurring in the situation of moles is

sometimes extremely difficult in their earlier stages, but as the disease progresses the greater malignancy of sarcoma soon manifests itself. The disease very soon returns in the cicatrix, increases in size with great rapidity, and runs through the various stages already described when treating of sarcoma. Secondary deposits very soon show themselves in various parts of the body, and are met with in the viscera after death. The prognosis in any case in which a mole or wart has become the seat of a sarcomatous growth is much more unfavorable than it is when they have degenerated into epithelioma.

#### EPITHELIOMA SUPERVENING ON SCARS.

The scars that remain after wounds, from whatever source they may have arisen, are sometimes the seats of epithelioma. Chronic ulcers originating in either disease or accident, and the intractable sores that result from burns and scalds—sometimes healed, often not—are likewise apt to develop the disease.

When a scar commences the onset of the disease, it may often be noticed at one point to become thinner, a little moisture escapes, and a scab and sore become established. At other times one or more small tubercles raise up the scar, and, breaking through, coalesce to form a kind of warty growth. On an open sore, where there has simply been for so long a smooth, unhealing surface, granulations spring up in some one spot, and, spreading gradually cover its entire extent. After a while the ulceration begins to widen, in places to deepen, and the edges



become raised and hardened. The periosteum and the bones themselves are penetrated by the advance of the growth, and if permitted to run on the patient is destroyed by the effects produced by the extent of the ulceration as well as by the secondary infiltrations of the adjacent glands.

## CHAPTER XXXVIII

E. PSAMMOMA (VIRCHOW); "SARCÔME ANGIOLITHIQUE"  
(MM. CORNIL AND RANVIER)

ALLUSION must here be made to a rare form of growth occasionally met with in the brain, spinal cord, and their membranes, to which Virchow has given the name of psammoma, from the circumstance of its containing "brain-sand" (*ψαμμος*, sand). MM. Cornil and Ranvier have styled this tumour "sarcôme angiolithique," from the close connection found by them to exist between the sandy particles and the small blood-vessels.

This growth, although having but little resemblance to the sarcomata is usually classified with this group of new formation, but which I make a distinct class of.

Its characteristic feature is that it consists largely of calcareous particles. The calcareous particles are contained in peculiar concentric bodies—the corpora amylacea—where they give rise to the so-called "brain-sand," hence the name of the growth.

The calcified corpora amylacea, associated with a varying quantity of a cellular and fibrillated tissue and blood-vessels, make up the growth. The cells bear a close resemblance to delicate irregular pavement epithelium.

Psammoma is usually met with growing from the

membranes of the brain or spinal cord or from the choroid plexus, where it occurs mainly as a cystic formation, and causing cerebral symptoms only when attaining a large size, or it may assume rather the appearance of a papillary or warty growth springing from the arachnoid or dura mater, and under these circumstances the flattened slowly growing projection may give rise to no symptoms during life. It is then of no pathological importance except when of sufficient large size to produce symptoms from pressure.

## CHAPTER XXXIX

### BENIGN CONNECTIVE-TISSUE TUMOURS

#### 1. FIBROMATA—SOFT AND FIRM. MODE OF ONSET

TUMOURS, which for the most part consist of well-developed connective-tissue, we call fibromata of the following varieties:—A. The soft fibrous tissue, or connective-tissue tumour. B. Hard fibromata, fibroids, and desmoid tumours.

A. The soft fibrous tumour occur rather frequently, and are generally found in the cutis; they consist of a very tough, rather œdematous, white tissue, and are generally covered by a thin papillary layer of the cutis. A microscopic examination shows loose connective tissue as in the cutis, and on the surface of the tumour almost always pointed papillæ, even when the tumours occur in places where the cutis normally is not covered with papillæ. In the rete Malpighii of these growths a brownish pigment is frequently found, seldom deeper in the tissue; they may also contain large vessels, and abnormally hypertrophied hair-follicles and sweat-glands on their surface. They are usually loose hanging and often well pedunculated growths. They may also be regarded as partial skin hyperplasias, as they chiefly consist of the elements of the cutis. Their

growth is very slow, absolutely painless, and it may proceed to an enormous size. Sometimes these tumours are congenital; they may be multiple; hundreds of such tumours may occur on the surface of the body. Congenital cutis proliferation occurs mostly on the face; it is generally one-sided, and either diffuse or localised in the form of cockscomb-like vegetations. The large moles—hairy *nævi* with pigmentation (mouse-skin, benign melanosis, pigmented fibromata)—belong to this class. These tumours develop most frequently at the end of middle life; in women it is not uncommon to find pendulous tumours of this kind on the labia majora, and as tumours on these parts are concealed as long as possible, they are generally very large before they come to the knowledge of surgeons. Virchow terms the disease which tends to the production of these multiple, soft, fibrous tumours, *Leontiasis*. In the course of time they occasionally give rise to general disturbance of the nutrition. Although these growths are not infectious in the sense already referred to, they nevertheless do sometimes lead to a cachectic condition, and in the course of years to death from marasmus.

B. Hard fibromata, fibroids, and desmoid tumours, to the naked eye seem to consist of a firm, closely-woven fibrous tissue. They are always of a very firm consistence, of rounded, knotty form, and in section either pure white or pale red. Some of them on their surface present a very peculiar, regular, and concentric arrangement in layers around distinct axes. With the external characters just described the histological appearance renders it difficult to assign a place to these tumours. There



can be no doubt that such of them as consist chiefly of firm connective tissue, as, for instance, all old uterine fibroids, must be called fibromata; younger tumours, however, with a similar appearance and consistence, show very little connective tissue but abundance of spindle-cells, closely allied to the spindle-celled sarcomata.

The position of fibromata varies greatly; of all the organs the uterus is the most frequently affected; here these tumours sometimes reach an enormous size and then sometimes calcify. Generally they are rounded in shape, they are clearly and sharply separated from the surrounding parts, they generally occur in the body of the organ, more rarely in the cervix, scarcely ever on the lips of the vagina; they usually grow upwards or downwards, that is, either towards the abdominal cavity with gradual stretching of the peritoneum, or through the os uteri into the vagina. In the latter direction these tumours grow more and more, are pedunculated, and often give rise to serious hæmorrhages. They are called fibrous polypi of the uterus.

Fibromata growing from the periosteum are very common, they are almost always fibro-sarcomata, that is, they are made up of fibres and spindle cells, and the latter sometimes predominate. The periosteum of the skull and of the bones of the face are very liable to this disease, and especially the under surface of the turbinated bone. Fibromata here appear as polypi in the nasal cavities and in the pharynx (fibrous naso-pharyngeal polypi).

They may cause absorption of the bone by pressure, and may even grow into the skull or into the antrum of Highmore; they are particularly rich in

cavernous veins. Besides these, I have seen fibromata on the periosteum of the tibia and also on the clavicle, and even in the interior of bones in the upper jaw, for instance, where I have also met remarkable combinations of chondroma and fibroma.

These tumours are peculiarly liable to occur about middle age (from thirty to fifty years); they seldom occur in youth, and almost never in advanced age; if we occasionally find them in the uterus of an aged woman they have probably been there for many years. Fibrous neuromata, and bone and periosteal fibromata, only occur in young persons. In general, fibromata occur somewhat more frequently in women than in men. Uterine fibroids develop between the thirty-fifth and forty-fifth years, although it may be much later before they give rise to much trouble; they are more often multiple than single. Periosteal fibromata are generally single; they may recur even after the course of many years. Fibromata generally grow from the centre; they are not infectious, though infectious fibromata are said to occur; a number of such tumours, near each other, may coalesce and infiltrate the surrounding parts, and occasionally cause fibrous degeneration of the nearest muscles, bones, and lymph glands. Pure fibromata generally grow very slowly, and in old age they sometimes cease to grow. This is best known of fibromata of the uterus, which may cease to grow after a period of involution and then calcify.

After what has been said the diagnosis of fibromata is not difficult; consistence, locality, mode of attachment, shape of tumour, almost always lead to a correct and sure diagnosis.

## CHONDROMATA—CARTILAGINOUS TUMOURS

These tumours consist of cartilage, either hyalin or fibro-cartilage. The microscopic elements of cartilage can assume different forms; sometimes one sees very beautiful round cartilage-cells, such as are found especially in the embryo, and also in a less degree in joint and rib cartilages. Such a complete transition of the hyaline intercellular substance into a homogeneous mass as obtains in normal cartilage, is somewhat rare in chondromata; the intercellular substance belonging to the different groups of cells is differentiated and the hyalin substance forms into fine fibres between the larger group of cells. The latter fact explains why cartilage tumours on section present the appearance of being traversed by interlacing and intercommunicating strands of connective tissue, which to the naked eye appear like network; the bluish or yellowish shining cartilage is seen embedded between these connective-tissue bundles.

Besides this, the tissue of a chondroma differs from that of normal cartilage in being supplied with blood-vessels, which run along these fibrous bands, while normal cartilage is known not to have vessels. It not infrequently happens that the intercellular substance, whether hyalin or slightly fibrillated, instead of having the uniformly firm consistence of normal cartilage, becomes more gelatinous or friable. Calcification of cartilage, also true ossification, are rather common in chondromatous tumours, the form of cells may be very different.

As regards the external form of chondroma, they are generally roundish, nodular, and sharply-defined

tumours, which sometimes grow to the size of a man's head. Their growth at first is purely central. In its further course, however, the tumour enlarges partly by the occurrence of new disease foci in the immediate neighbourhood, partly by the conversion of the nearest tissue into cartilage. The result of pulpy mucous softening cysts develop in these tumours, in consequence of which the otherwise hard chondromata may present partial fluctuation. It is conceivable that, after complete ossification of the chondroma has taken place, the tumour might cease to grow, and this has actually been observed in a few cases. Superficial ulceration may occur in large chondromata, especially when the skin is highly tense, as the result of traumatic irritation; ulcerative softening in the interior, with perforation outwards are rare events.

Cartilaginous tumours occur very frequently on the bones. The phalanges and metacarpal bones are the most frequent seats of chondromata; more rarely the analogous bones of the foot. On the other hand, the chondromata are almost always multiple, sometimes in such numbers that scarcely a finger is free; next come the thigh bone and the pelvis as favourite seats. In these positions they attain their largest size, and may lead to the most complete destruction of these bones. In soft parts, and especially in glands (testes, ovaries, mamma, salivary glands), these tumours have been observed.

The development of chondroma is chiefly peculiar to youth, about the age of or just before puberty, usually dating from this period, even although they may not be observed until in later life. These tumours sometimes occur after injuries; they grow

exceedingly slowly, and appear from time to time to come to a complete stand still, unchanged perhaps for years ; sometimes, however, they grow more rapidly and become infectious. Cases are on record in which finally cartilaginous tumours have occurred in the lungs and caused death.





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